York Archaeology

# Keepmoat, Scunthorpe: Geoarchaeological Assessment

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YA Assessment Report 2024/054 February 2024

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# KEY PROJECT INFORMATION

| | |
|---|---|
| Project Name | Keepmoat, Scunthorpe: Geoarchaeological Assessment |
| YA Project Code | 3105 |
| Report status | Draft |
| Type of Project | Geoarchaeological Assessment |
| Client | MAP Archaeological Practice |
| Planning Reference | PA/2023/1124 |
| OASIS ID | |
| NGR | SE 86168 08608 |
| | |
| Authors | Luke Parker |
| Illustrations | Luke Parker |
| Editor | Kristina Krawiec |
| Report Number | YA/2024/054 |
| Version and Filename | 3105_Keepmoat_GA_V1.2 |

**Abstract**

*York Archaeology (YA) were commissioned by MAP Archaeological Practice to undertake geoarchaeological recording of machine-dug test pits between December 2023 and January 2024. This report presents the fieldwork results across the Keepmoat site, Scunthorpe, a proposed development of housing and an artificial lake. The Keepmoat site forms the first part of the overall Lincolnshire Lakes development which will eventually consist of 2500 dwellings, a village centre, school, healthcare facility and recreational lakes.*

*Recording of machine-dug test pits within evaluation trenches demonstrated that the site was dominated by aeolian sand deposits which are mapped regionally by the BGS as the Sutton Sand Formation. Within the upper portion of this sand were deposits of peat which were present immediately beneath either the top/sub-soil or silty clay warping deposits. The peat recorded during the investigation is similar to that which has been recorded by previous geoarchaeological investigations at the wider Lincolnshire Lakes site; where it is likely a series of relatively small, discrete peat deposits which formed locally within coversand depressions over a wide variety of time periods. The warp deposits had a very diffuse boundary with the subsoil, which likely represents the truncated, ploughed remnants of the warp. Recent agricultural activity throughout the site had led to extensive intrusion of modern organic material into the underlying sediment; primarily rooting from extant agricultural crops.*

*The stratigraphic data from these interventions was integrated along with all other previous investigations undertaken at the wider Lincolnshire Lakes site to produce the most comprehensive geoarchaeological deposit model yet developed for the site. This model demonstrates the highly irregular distribution of peat throughout the Lincolnshire Lakes site at a variety of elevations from around 2.50m OD to 0.20m OD. Radiocarbon dates recovered from the peat as part of previous investigations have also been collated and demonstrate the peat deposits throughout the site accumulated across wide range of periods; from up to 7000 BC until around 1500 BC.*

*Modelling of warp deposits throughout the Lincolnshire Lakes site has also enabled further insights to be developed as to its distribution and formation. The warping deposits recorded at the Keepmoat site likely reflect warping associated Healey's Drain which demarcates the southern boundary of the site and was excavated in 1842 by local landowner Henry Healey. Throughout the remainder of the site, warp deposits were modelled as present predominantly to the west of the site; with the drainage channel Earl Beauchamp's Drain (mapped by both historic mapping and Lidar) forming the eastern boundary for the majority of the warping deposits. This drain formed part of a process of warping that was initiated at least twenty to thirty years after Henry Healey by the Earl of Beauchamp. A further band of warp deposits were recorded to the east alongside Brumby Common Lane where a warping drain connected into the larger Earl Beauchamp's Drain.*

# 1. INTRODUCTION

## 1.1 Site background

1.1.1 York Archaeology (YA) were commissioned by MAP Archaeological Practice to undertake geoarchaeological recording of machine-dug test pits at the prospective development site of Lincolnshire Lakes, Scunthorpe (NGR SE 86168 08608; Figure 1). In total, fifty-three machine-dug test pits were recorded within archaeological evaluation trenches carried out by MAP. These new interventions were integrated alongside the results of previous investigations at the broader Lincolnshire Lakes site to produce a combined deposit model and overall interpretation for the scheme.

1.1.2 The proposed development which this report relates to involves the construction of up to 600 homes, open spaces and landscaping, drainage and a recreational lake (PA/SCR/2022/1). This development forms the first part of the larger, overall Lincolnshire Lakes development which has received outline planning permission (PA/2015/0396) for the erection of up to 2500 dwellings, a village centre, a school, healthcare facility, wildlife habitats and lakes.

1.1.3 This investigation followed the geoarchaeological methodology established within the archaeological Written Scheme of Investigation (WSI) that was produced by YA and MAP (MAP, 2022).

## 1.2 Geology and Topography

1.2.1 The site is located at the western edge of the town of Scunthorpe, centred approximately at NGR SE 86168 08608 (Figure 1). It is situated at the eastern margin of the Trent floodplain and west of the Scunthorpe escarpment. At the time of investigations, the Site comprised uncultivated, ploughed agricultural fields.

1.2.2 The M181 motorway forms the western boundary of the Site whilst Burringham Road forms the southern boundary. The eastern boundary is demarked by Carisbrooke Manor Lane and the north is formed by a field boundary.

1.2.3 The following geological information has been taken from the previous York Archaeology geoarchaeological monitoring project which was undertaken as part of the Lincolnshire Lakes development and located to the immediate north of the site (YA, 2023a).

1.2.4 The underlying geology of the Site as mapped by the British Geological Survey (BGS) is that of the Triassic Mercia Mudstone Group. Of the three open-access BGS boreholes located within the Site boundary, the bedrock is recorded between depths of 14.00 to 15.95m Below Ground Level (BGL) (-11.30 to -13.43m OD; see Tables 1-3 below). The north-eastern margin of the Site at the foot of the Scunthorpe escarpment is mapped as Penarth Group mudstone.

1.2.5 The superficial deposits of the area are likely to be complex comprising warp, Alluvium, Peat and Sutton Sand Formation.

1.2.6 Detailed palaeoenvironmental survey has been carried out in close proximity to the Site to the south of Flixborough, *c*. 5.50km north of the site; this work, undertaken as part of the Humber Wetlands Survey, encompassed the entirety of the Trent Valley floodplain (Lille, 1998).

1.2.7 Three open-access BGS boreholes are located within the site boundary (Figures 2 and 3; Tables 1, 2 and 3).

| **BGS Interpretation** | **Simplified Description** | **Depth Top (m BGL)** | **Depth Base (m BGL)** | **Thickness (m)** | **Elevation Top (m OD)** | **Elevation Base (m OD)** |
|---|---|---|---|---|---|---|
| Soil | - | 0.00 | 1.00 | 1.00 | 2.52 | 1.52 |
| Warp | Silt and clay | 1.00 | 1.40 | 0.40 | 1.52 | 1.12 |
| Peat | Peat | 1.40 | 2.50 | 1.10 | 1.12 | 0.02 |
| Blown Sand | Coarse to fine sand, | 2.50 | 6.00 | 3.50 | 0.02 | -3.48 |
| Glaciofluvial Deposits | Clay and silty sand | 6.00 | 10.00 | 4.00 | -3.48 | -7.48 |
| Sand and Gravel | Coarse to fine sand and gravel | 10.00 | 15.95 | 5.95 | -7.48 | -13.43 |
| Mercia Mudstone | Mudstone | 15.95 | / | / | -13.43 | / |

Table 1: BGS borehole SE80NE26

| **BGS Interpretation** | **Simplified Description** | **Depth Top (m BGL)** | **Depth Base (m BGL)** | **Thickness (m)** | **Elevation Top (m OD)** | **Elevation Base (m OD)** |
|---|---|---|---|---|---|---|
| Topsoil | Black, silty | 0.00 | 0.20 | 0.20 | 2.70 | 2.50 |
| Blown Sand | Fine sand, well rounded | 0.20 | 9.10 | 8.90 | 2.50 | -6.40 |
| Glaciofluvial Deposits | Silty clay, laminated in parts | 9.10 | 10.90 | 1.80 | -6.40 | -8.20 |
| Sand and Gravel | Medium to fine sand | 10.90 | 14.00 | 3.10 | -8.20 | -11.30 |
| Mercia Mudstone | Mudstone | 14.00 | / | / | -11.30 | / |

Table 2: BGS borehole SE80NE70

| **BGS Interpretation** | **Simplified Description** | **Depth Top (m BGL)** | **Depth Base (m BGL)** | **Thickness (m)** | **Elevation Top (m OD)** | **Elevation Base (m OD)** |
|---|---|---|---|---|---|---|
| Topsoil | Black, silty | 0.00 | 0.50 | 0.50 | 3.27 | 2.77 |
| Blown Sand | Medium and fine sand | 0.50 | 7.30 | 6.80 | 2.77 | -4.03 |
| Glaciofluvial Deposits | Calcareous silty clay | 7.30 | 8.85 | 1.55 | -4.03 | -5.58 |
| Glaciofluvial Deposits | Medium and fine sand | 8.85 | 9.60 | 0.75 | -5.58 | -6.33 |
| Glaciofluvial Deposits | Soft brown silty calcareous clay | 9.60 | 10.00 | 0.40 | -6.33 | -6.73 |

| BGS Interpretation | Simplified Description | Depth Top (m BGL) | Depth Base (m BGL) | Thickness (m) | Elevation Top (m OD) | Elevation Base (m OD) |
|---|---|---|---|---|---|---|
| Glaciofluvial Deposits | Firm brown silty calcareous clay | 10.00 | 10.35 | 0.35 | -6.73 | -7.08 |
| Sand and Gravel | Medium and fine sand with gravel | 10.35 | 15.10 | 4.75 | -7.08 | -11.83 |
| Mercia Mudstone | Mudstone | 15.10 | / | / | -11.83 | / |

Table 3: BGS borehole SE81SE31/A

1.2.8 The BGS boreholes indicate that a suite of deposits overly the mudstone bedrock. These appear to comprise of a basal sand with some gravel, which may be fluvial or glaciofluvial in origin. These deposits are overlain by a sequence of silts, sands and clays, which have been also been interpreted in the logs as being glaciofluvial. However, within the locale of the Site, very little work has been done to corroborate the origin of these deposits, largely owing to their depth of burial and lack of exposure. The uppermost sediments within the boreholes comprise a mixture of aeolian sands, peats and warp; whilst the first two are natural accumulations, the latter (warp) is an anthropogenic sediment deposited across such low-lying landscapes in order to improve soil fertility (Lillie, 1997, 1998).

## 1.3 Planning Background

1.3.1 Developments of this nature, and their impact upon the historic environment, are addressed by the revised 2023 '*National Planning Policy Framework*' (NPPF) published by the Ministry of Housing, Communities and Local Government (MHCLG), and the NPPF Planning Practice Guide '*Conserving and Enhancing the Historic Environment*' (DCLG, 2014).

1.3.2 Section 16 of NPPF, paragraph 198 states:

*Local planning authorities should maintain or have access to a historic environment record. This should contain up-to-date evidence about the historic environment in their area and be used to:*

*a) assess the significance of heritage assets and the contribution they make to their environment; and*

*b) predict the likelihood that currently unidentified heritage assets, particularly Sites*

*of historic and archaeological interest, will be discovered in the future.*

1.3.3 In addition, paragraph 200, states that:

*In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record* *should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a Site on which development is proposed includes, or has the potential to include, heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.*

1.3.4 Furthermore, paragraphs 205 and 211 of the NPPF state:

*When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance.*

*Local planning authorities should require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. However, the ability to record evidence of our past should not be a factor in deciding whether such loss should be permitted.*

## 2. GEOARCHAEOLOGICAL BACKGROUND

2.1.1 The following geoarchaeological and archaeological background has been taken from the earlier geoarchaeological monitoring project (YA, 2023a):

2.1.2 The most extensive deposit mapped by the BGS is the Sutton Sand Formation, sometimes referred to as Blown Sand on earlier maps and adjacent (BGS map) sheets, as well as coversands in other publications. These deposits are principally mapped across the northern, eastern, and southern margins of the site, representing accumulations of aeolian material against the Scunthorpe escarpment.

2.1.3 Deposits of the Sutton Sand Formation are concentrated in an area between York and Lincoln and were originally deposited towards the end of the last glaciation during the Last Devensian, although no precise chronology exists with regards to the retreat of the ice front within the Vale of York and wider Humberhead region (Bateman et al. 2015). However, organic sediments underlying the Sutton Sand Formation at Sutton on the Forest, some 60km north-west of the Site, have been dated to 12,879 +/- 168 cal yr BP indicating that the ice sheet front must have retreated to the north of this location by the Late Devensian (Bateman et al. 2015). Locally, west of Scunthorpe, borehole data have shown that the aeolian sands range from 1.50m to 9.00m in thickness and are likely to have been extensively reworked in the Holocene (McIlwaine and McDonnell, 2006), a conclusion supported by multiple sites regionally (Baker *et al*., 2013; Bateman *et al*., 2000). Detailed investigations as part of the '*North Lincolnshire Coversands Research Project*' (McIlwaine and McDonnell, 2006) at Willow Holt Quarry, Flixborough, indicate that the 'coversands' have been accumulating and reactivating since *c*.11,000 BP. Such reprofiling of the sands has the potential to bury and seal former land surfaces, which may include multi-period archaeological remains including lithic scatters.

2.1.4 The Sutton Sand Formation deposits are complicated by the presence of peat underlying, interbedded, and overlying the sand accumulations. This has been demonstrated to various degrees from previous investigations as part of recent archaeological / geoarchaeological work in adjacent areas, some of which overlap with the site boundary (YA 2021, YA 2023a, YA 2023b).

2.1.5 The results of the radiocarbon age estimates from investigations undertaken by ASWYAS (Archaeological Service West Yorkshire Archaeological Service) and AOC are provided in Table 4 using information replicated from the initial evaluation and post-excavation assessment reports (AOC 2017a; AOC 2017b; YA 2021).

| **Core / Trench** | **Sample** | **C14 Elevation (m OD)** | **C14 Sample Depth (m BGL)** | **Radiocarbon Age (BP)** | **Calibrated Date (95.4%)** |
|---|---|---|---|---|---|
| AOC Trench 1 | Peat (Humic Acid) | 1.41 | 0.67 | 4676 ± 33 | 3624-3367 cal BC |
| ASWYAS Trench 12 | *Maloideae* roundwood | 0.97 | 1.06 | 3710±30 | 2201 to 2024 and; 1993 to 1983 cal BC |
| ASWYAS Trench 12 | Peat (Humin Acid) | 0.77 | 1.26-1.30 | 4040±30 | 2632 to 2469 and: 2663 to 2651 cal BC |
| AOC Core 1A2 | Macroplant | 0.76 | 1.64 | 268 ± 27 | 1521-1798 cal AD |
| AOC Trench 4 | Peat (Humic Acid) | 0.71 | 1.69 | 1434 ± 33 | 568-657 cal AD |
| AOC Core 1A2 | Peat (Humic Acid) | 0.50 | 1.90 | 5785 ± 25 | 4707-4555 cal BC |
| AOC Trench 7 | Peat (Humic Acid) | 0.56 | 1.60 | 7515 ± 33 | 6451-6261 cal BC |
| AOC Core 1A3 | Peat (Humic Acid) | 0.30 | 2.10 | 6723 ± 28 | 5707-5568 cal BC |
| ASWYAS Trench 12 | Peat (Humin Acid) | 0.27 | 1.76-1.80 | 8170±30 | 7194 to 7065 and; 7317 to 7266 and; 7261 to 7226 cal BC |
| ASWYAS Trench 12 | Peat (Humic Acid) | 0.27 | 1.76-1.80 | 6700±30 | 5670 to 5605 and; 5600 to 5556 and; 5708 to 5609 cal BC |
| AOC Core 1A4 | Macroplant | -1.03 | 3.43 | 6951 ± 31 | 5902-5741 cal BC |

Table 4: Radiocarbon age estimates from AOC (2017a&b) core 1, trenches 1, 4, and 7, and ASWYAS Trench 12. The dates are displayed in descending order of elevation. Note, no laboratory references numbers were provided in the AOC reports and the sample types, sample depths, and elevations have been reproduced using the information contained within the reports. All sub-samples from which material was dated derives from peat deposits.

2.1.6 Table 4 outlines radiocarbon age estimates from previous locations within the Lincolnshire Lakes Site boundary. Those dates highlighted in dark grey are likely to be the result of intrusive elements and are therefore deemed unreliable. The single result from AOC Trench 7 in light grey may also be unreliable given that the radiocarbon age / calibrated date does not correspond with the sample elevations.

2.1.7 Recent geoarchaeological monitoring and deposit modelling (YA, 2023a) identified that peat was buried and interbedded within the sands, particularly within the upper 2.00m of stratigraphy, however, could be occasionally encountered deeper. These peats were interpreted as being formed in relatively small, discrete deposits rather than as a continuous, single unit of sediment due to their broad altitudinal variation as well as range of radiocarbon dates from previous excavations (Table 4).

2.1.8 Peat was also recorded within the broader area, on the left bank of the Trent (YA, 2022) where mid-Mesolithic reworked sands were overlain by Neolithic to Early Bronze Age peat at elevations between 0.28 to 0.67m OD.

2.1.9 The upper sequence of superficial deposits is further complicated by the presence of warp. Warp consists of fine clays and silts, representing a blanketing deposit which was formed within the Lower Trent Valley by deliberate tidal inundation of the low-lying landscape for two principal reasons: (1) to make unproductive peaty and acidic soils workable, and; (2) to reduce the impact of natural seasonal inundations and waterlogging by artificially raising the ground surface level (see Lille, 1997, 1998). This process was largely achieved by the deliberate 'flood-warping' of areas, with material (silts and clays) carried in tidal suspension being allowed to settle and accumulate throughout areas where warping was desirable. The extent of warping is summarised by BGS mapping; '*most of the (Trent) floodplain south of Neap House (to the north-west of the Site) is occupied by flood-warp, which was allowed to run from the levee slopes east towards to the rising blown sand outcrops*' (cf Gaunt 1976, 419, in Lille 1998b). Specifically, the land south of Crosby (the Great Common) to the north of the Site, underwent warping from 1808, with 243 ha of ings, common and moor warped until *c.* 1832 (Lille 1998, 110). A substantial warping drain is located within the north-east half of the Site, continuing to the north / north-west, as well as forming part of the Site's northern boundary (Earl Beauchamp's Warping Drain). Elsewhere within the Lower Trent Valley and Humberhead region, warping deposits have been demonstrated to seal former land surfaces, in addition to smoothing out any subsurface topographic variation (see Lillie, 1997, 1998).

2.1.10 The BGS have mapped warping deposits across much of the site (Figure 3) and they were recorded in all the test pits monitored by Allen Archaeology (2015a) in the southern half of the site, with the exception of TP6, TP13 and TP14 where Sutton Sand Formation was recorded immediately underlying the topsoil (Figure 2). Warping deposits were recorded as sealing peat or Sutton Sand Formation deposits in all trenches and boreholes undertaken as part of the works by AOC (2017a and 2017b) in the south-west corner of the site. Warping deposits were also recorded in all the test pits and trenches excavated by ASWYAS within the boundary to the east of the M181 (Figure 2). Approximately 0.40m of warp is also recorded in BGS borehole SE80NE26 but are absent in the two additional boreholes located within the site boundary (see Tables 1-3).

2.1.11 There was a complete absence of warping deposits in a recent evaluation to the north-east of the site (YA, 2023b), despite the area being mapped as having such deposits. Likewise, the recent geoarchaeological monitoring (YA, 2023a) recorded that warp deposits were discontinuous and associated with specific infilled warping drains, including Earl Beauchamp's Drain, which had been mapped from a combination of Lidar, aerial photography, and HER datasets.

## 2.2 Archaeological context

### MESOLITHIC (*c*.9500 – *c*.4000 cal BC)

2.2.1 Peat dating from the Later Mesolithic (Table 4) has been recorded in previous investigations within the Lincolnshire Lakes site boundary. This is indicative of a Mesolithic land surface which has been subsequently masked by post-medieval warp deposits. No Mesolithic findspots are known from within the site boundary, but this is unsurprising given the blanket of warp covering the majority of the site. It is possible that further to the east, where warp deposits are less likely to be present, that peat and/or Sutton Sand Formation may be present below topsoil.

### NEOLITHIC AND EARLY TO MIDDLE BRONZE AGE (*c*.4000–*c*.1150 cal BC)

2.2.2 Peat accumulations appear to have continued from the Mesolithic into the Neolithic (Table 4). No Neolithic findspots are located within the immediate site boundary, however chance findspots have been located within 0.50km to the north-east of the site (HER 1914, 1915). These represent localised and isolated finds and are confined to higher ground where warp accumulations are not present to mask prehistoric land surfaces.

2.2.3 Accumulations of peat have also been demonstrated to continue into the Early Bronze Age within the site boundary (Table 4). Additionally, a potential ring ditch (HER 25906) is located at SE 8646 0957 within the Lincolnshire Lakes site boundary, to the immediate west of the main warping drain having been identified and interpreted through geophysical survey (Pringle, 2015). There is currently no further evidence to demonstrate the location or extent of Bronze Age settlement within the site.

### EARLY MEDIEVAL (*c*. AD 410–1066)

2.2.4 Brumby derives its name from the Old Norse personal name of 'Bruni' and the Old Norse term 'by', meaning farmstead (Institute for Name-Studies, 2023). The Scandinavian settlement in Lincolnshire took place after over-wintering of the Viking 'Great Army' at Torksey in AD 872 and Repton in AD 873, and their control of Lincoln from AD 876.

### HIGH MEDIEVAL (AD 1066–1485)

2.2.5 In the AD 1086 Domesday Survey, Brumby is recorded as '*Bruneb*i', located in the hundred of Manley, with 14 freemen, 3 men's plough teams and 80 meadow acres to its land and resources (Foster and Longley, 1942, 20).

2.2.6 During the later medieval period the site formed part of the Brumby Common with the site record as being 'Heathland' by the North Lincolnshire Historic Landscape Characterisation (HLC) record. This would indicate that the land within the site was utilised for livestock grazing as opposed to arable uses.

2.2.7 A feature named '*Brumby caucee*' was recorded in a Lindsey Court roll in AD 1446 (Peacock, 1889, 101). A '*caucee*' or 'causey' was a route "over boggy land, that has been made by raising a bank above the level of the water as it stands in flood time" (Peacock 1889, 100). In that case, *Brumby Caucee* may have been a name for the part of Frodingham Causeway (HER 25905), which ran within the Manor of Brumby. Should that be the case, the AD 1446 reference would be the earliest documentary evidence for activity within the site

### POST-MEDIEVAL (AD 1485–1750)

2.2.8 An AD 1558 inquisition of Sewers record of 'Brumby causey' states that this feature had "dikes to either side" (quoted in Peacock 1889, 102). This may support the suggestion that Brumby Causeway was Frodingham Causeway, as the part of the causeway identified in the south-western part of the site during the 2015 geophysical survey has ditches to either side of the raised bank (Allen Archaeology, 2015c, 6-7). Should this be correct, this would indicate that the ditches of Frodingham Causeway remained open in the mid-16th century. The AD 1558 inquisition ordered that the 'dikes' were to be "*sufficiently scowred and cleansed*" (quoted in Peacock 1889, 102). As such, these works may have removed any earlier materials that would have been deposited within the ditches.

**MODERN (AD 1750 TO PRESENT)**

2.2.9 As previously discussed, the wider landscape around the site started to undergo warping in the early 19th century to transform and elevate the previously waterlogged, low-lying landscape for arable agriculture.

2.2.10 Around AD 1863, further warping works were undertaken, with a large, canalised warping drain being constructed along what is now the site's northern boundary (HER 24682). Part of this large warping drain continues in the north-eastern half of the site, extending into the southern half of the site. In addition, there are two further buried probable warping drains in the southern half of the site (HER 25977 and HER 24683). These works are likely to form part of the wider warping network (Figure 4).

2.2.11 Monitoring of two test pits (TP9 and TP10) by Allen Archaeology (2015a) observed features interpreted as a continuation of the large warping drain in the southern half of the site. It was therefore possible that similar features will be encountered during the monitoring of the proposed test pits across the site.

## 3. PROJECT AIMS AND OBJECTIVES

3.1.1 The aims and objectives of the project were established within the archaeological WSI (MAP, 2022):

3.1.2 The aims of the work were to:

- To determine the presence/absence, nature, date, quality of survival and importance of archaeological and paleoenvironmental deposits to enable an assessment of the potential and significance of the archaeology and paleoenvironment to be made;
- To establish the chronology of the sediment sequence, particularly with reference to the peat development at the site;
- To determine the potential for the underlying sands to preserve archaeological remains and land surfaces

3.1.3 The main objectives of the work were as follows:

- To undertake test trenching across the site and to make a record of any archaeological features/deposits;
- To recover dateable artefacts and environmental samples to characterise the activity at the site;
- To undertake test pitting to record the lithology of the underlying sands/peat deposits;
- To recover samples for paleoenvironmental assessment and scientific dating;

- To create a deposit model and archaeological framework for the site using the results of the test pitting and previous phases of work;

- To present the results of the fieldwork, deposit modelling and any palaeoenvironmental assessment in a report;

- To inform the requirement for and scope of any archaeological mitigation including further archaeological works which may be required.

**Research Questions**

3.1.4 The aims and objectives described above for this site have the potential to address the following topics identified within the East Midlands Research Agenda (http://archaeologydataservice.ac.uk/researchframeworks/eastmidlands/wiki/Main):

| **2 MESOLITHIC (c.9500 - c.4000 cal BC)** |
|---|
| 2A - Enhance understanding of the environmental background to Mesolithic activity:<br><br>'By comparison with some other areas of the country, the Mesolithic environment of the East Midlands is little known… There is a need to obtain more closely dated pollen sequences from upland, riverine and coastal peat deposits and to extend the investigation of ancient environments to include isotope studies of the organic fractions of coastal and riverine sediments.' |
| *2.6.1 What can analyses of cave deposits, palaeochannel fills, upland peats and other deposits with potential for preserved pollen, charcoal and other organic remains contribute to studies of the earliest stages of woodland clearance and plant domestication?* |
| *2.6.2 How can we maximise the potential of palaeochannels, upland or coastal peats and other organically rich deposits as sources of data on Early Holocene landscapes and changes in subsistence strategies and diet?* |
| 2H - Investigate the transition from the Mesolithic to Neolithic:<br><br>'The issue of changing subsistence strategies and the relationship between Mesolithic and Neolithic lifeways can be addressed in part by consistent sampling of organic material preserved in palaeochannels and other waterlogged or wetland contexts spanning the transition period.' |
| **NEOLITHIC AND EARLY TO MIDDLE BRONZE AGE (c.4000–c.1150 cal BC)** |
| 3E - Target Sites with Late Mesolithic and Early organic remains:<br><br>'…significantly more organically rich contexts of this period need to be targeted for environmental analysis and radiocarbon dating to elucidate patterns of landscape change during this key transitional period. Particular attention should be focused upon Sites preserving organic remains that may be threatened by dewatering, while the information |

| |
|---|
| gained from Sites under threat from development should be maximised.’ |
| 3.2.3 How may environmental sampling strategies assist in elucidating the transition from later Mesolithic to earlier Neolithic economies? |
| 3.7.2 What ceremonial or ritual roles may rivers or other watery locations have performed and how may this have varied regionally and over time? |

3.1.5 The *Lincolnshire Coversands Project* recommended a number of key considerations for future work in the area (McIlwaine and McDonell, 1996). These included elucidating the extent, depth and topography of the coversands.

3.1.6 Additionally, recent work in the development of the national *Mesolithic Research and Conservation Framework* highlights the targeting of research on sites at risk such as wetland sites where peat is drying out (Blinkhorn and Milner, 2013, 30). Key themes were identified in relation to prospection of sites:

*S2.2: Broader use of fieldwalking, test-pitting and other low-impact techniques is needed, especially within a developer-led context.*

*S2.4: Novel methodologies to evaluate the locations of Mesolithic activity should be sought and successes in the field appropriately communicated across all sectors. For instance, these might be grounded in geoarchaeological modelling, or the application of borehole, coring and sieving strategies.*

## 4. GEOARCHAEOLOGICAL METHODOLOGY

### 4.1 Fieldwork Methodology

4.1.1 All works were undertaken in accordance with the WSI as approved by the County Council Planning Archaeologist and to standards defined by CIfA Guidelines for Recording of Archaeological Sites (2019; 2020a; 2020b).

4.1.2 Archaeological evaluation trenches were located by a MAP archaeologist using a survey-grade GPS. Overburden, topsoil and subsoil was removed by a mechanical excavator using a toothless blade under supervision in level spits of <100mm until the upper surface of the superficial geology was encountered. At one end of each evaluation trench, a geoarchaeologically monitored test pit was excavated using a mechanical excavator in 100mm-spits down to around 3.00m BGL, or up to test pit side collapse.

4.1.3 The lithology of the geoarchaeological test pits was recorded using the sediment classification system of Troels Smith (1955). Although the machine-dug test pit within each evaluation trench was monitored, the numbering is the same as the evaluation trenches (e.g. Tr04). The scheme breaks down a sediment sample into four main components and allows the inclusion of extra components that are also present, but that are not dominant. Key physical properties of the sediment layers are darkness (Da), stratification (St), elasticity (El), dryness of the sediment (Sicc) and the sharpness of the upper sediment boundary (UB). A summary of the sedimentary and physical properties classified by Troels-Smith (1955) is provided in Appendix 1.

4.1.4 The descriptive logs (Appendix 2) were supplemented by digital photography carried out using a DSLR with a minimum sensor size of 10 megapixels. All photography adhered to Historic England guidance for *Digital Image Capture and File Storage* (HE 2015b). Graduated metric scales of appropriate lengths were used, ensuring the use of vertical scales used against deep sections in combination with horizontal scales. Digital photographs intended for archive purposes will comply with AAF and ADS guidance (i.e. high quality non-proprietary raw files (DNG) or TIFF images).

4.1.5 The sampling followed procedures set out within the Historic England Guidance for *Environmental Archaeology* and *Geoarchaeology* (HE 2011 and HE 2015a). Should waterlogged wood be encountered species identification was carried out with reference to Schweingruber (1990) and Schoch (2004). The consideration of preservation within the deposits was made with specific reference to Historic England's Guidance document for *Preserving Archaeological Remains* (HE 2016).

4.1.6 A deposit model was constructed using the results of the monitoring, as well as all previous investigations which had been undertaken at the site (AOC 2017a & b; Allen Archaeology 2015; YA, 2023a & b; Trent and Peak 2021). The modelling followed procedures set out within the Historic England Guidance for *Deposit Modelling and Archaeology* (HE 2020). Based on the inputted stratigraphic data, modelled surfaces were created to aid visualisation using ArcGIS incorporating available Lidar data as digital terrain models with multi-directional hillshading and/or local relief modelling used to aid interpretation.

4.1.7 The data is archived in an excel spreadsheet.

### 4.2 Fieldwork constraints

4.2.1 Due to the sandy composition of the superficial strata, the test pits were very unstable and frequently collapsed shortly after 2.00m BGL. This frequently prevented test pit excavation up to the maximum 3.00m depth.

## 5. RESULTS

### 5.1 Lithology

5.1.1 The earliest deposits recorded during test pit and monitoring were fine sands, which occasionally contained a minor medium sand component. These sands were pale yellow or grey throughout much of the sequence, though infrequently they were of a more orange colour towards the upper part of the sequence; this colour change may reflect increased oxidation as a result of recent agricultural activity. The fine sand formed the large majority of all recorded sequences and often composed the entirety of the lithological sequence underlying recent topsoil.

5.1.2 Within this fine sand in 44 of the 53 monitored test pits was peat which was recorded at varying depths. This peat was predominantly present as a single unit, however within four test pits (Tr20, Tr32, Tr33, and Tr34) peat was recorded as two units, each separated by fine sand. Within most test pits the peat was recorded at between 0.40-1.00m BGL, or 0.24-1.60m OD. The peat which was found as a single unit between 0.24-1.60m OD was consistently very well-humified with few apparent organic inclusions present. This peat was also generally relatively sandy, with fine sand being mixed into the upper or lower boundaries of the unit.

5.1.3 The four test pits which recorded a second peat layer were Tr20, Tr32, Tr33, and Tr34. The second peat layer within these trenches was at 2.50-2.70m BGL (Tr20), 2.70-2.85m BGL (Tr32 andTr33), and 2.50-2.75m BGL (Tr34). The peat within Tr20, Tr33 and Tr34 was a moderately humified woody peat with a slight sandy component, whereas within Tr32 the peat was well-humified with few identifiable organic inclusions. The woody inclusions consisted predominantly of pieces of roundwood with the occasional larger piece which frequently recorded bark.

5.1.4 Overlying the fine sand and/or peat within seven of the monitored test pits (Tr42, Tr43, Tr46, Tr48, Tr52, Tr55, and Tr57) was a relatively firm dark grey, occasionally silty, clay recorded around 0.30m BGL (1.40-2.00m OD). This (silty) clay was interpreted as a warp deposit resulting from deliberate flooding during the 19$^{th}$ century.

5.1.5 The warp deposits were overlain by topsoil and subsoil. The subsoil had a very diffuse lower boundary with the warp deposits, where present suggesting it may be the truncated, ploughed remnants of the warp. Recent agricultural activity throughout the site had led to extensive intrusion of modern organic material into the underlying sediment; primarily rooting from extant agricultural crops.

### 5.2 Deposit Modelling and Historic Mapping

5.2.1 A Lidar model for the Keepmoat site boundary as well as the rest of the Lincolnshire Lakes site was developed which illustrated the variation in elevation levels throughout the Site (Figure 02). There is a broad trend of the north and eastern portions of the site being at around 3.00m OD and sloping very gradually down to the south and west up to around 1.60-2.00m OD. The Keepmoat site is distinctive in that in contrast with the remainder of the Lincolnshire Lakes site, it has a complete lack of apparent topographic features. The remainder of the site has a number of infilled warping channels; particularly in the fields between Brumby Common Lane and Burringham Road, and in the fields to the east of Brumby Common Roundabout (Figure 06).

5.2.2 Surface models were developed in QGIS for the peat and warp to illustrate both the location of these deposits and the elevation (OD) of their upper boundaries (Figures 03 and 04). These surface models incorporate data from all previous investigations at the Lincolnshire Lakes site (AOC 2017a & b; Allen Archaeology 2015; YA, 2023a & b; Trent and Peak 2021) to generate models which present a more holistic and accurate representation of the superficial geology for the site, and better illustrates the spatial extent of the peat and warp deposits.

5.2.3 The warp deposits are focused particularly towards the west of the Lincolnshire Lakes site; with a secondary band following the course of Brumby Common Lane (Figure 03) and a smaller area within the southern portion of the Keepmoat site boundary. The elevation of the upper warp surface was broadly around 1.70-2.20m OD for the majority of the site, however the warp surface within the Keepmoat site boundary was somewhat lower in elevation, closer to 1.00m OD. It should be noted that although the model (Figure 03) suggests lower elevation for the warp towards the edges of its extent, this is an artefact of the modelling and not a true representation of the warp surface.

5.2.4 The model of the peat upper surface demonstrates a much more widespread distribution of peat than the warp, with it being present throughout the majority of the Lincolnshire Lakes site (Figure 04). The model illustrates the variation in elevation for the peat, where it was present at all depths from 2.50m OD in the north-east of the site and around 0.20m OD within the Keepmoat site boundary in the south. This trend, though also likely reflecting genuine variability in peat elevation, also reflects the broad topographic trend with higher ground in the north and east, and lower ground in the south and west (Figure 02). The concentration of high-elevation peat in the north-east of the model is not a genuine presence of peat and is instead a reflection of the absence of data points within and around Brumby Common Wood.

5.2.5 Comparing the distribution of interventions where warp was recorded with historic mapping demonstrated a clear correlation with warp presence and 19th century land modification. Warp deposits were modelled to be present primarily within the west of the Lincolnshire Lakes site (Figure 03) and comparing the location of these deposits with the 1885 OS map illustrates that the limit of warp-containing interventions coincides with drainage features (Figure 06). These features are clearly observable on Lidar (Figure 02), and have been mapped and superimposed onto the 1885 OS map (Figure 06). Of the mapped drainage channels, the channel mapped as Earl Beauchamp's Drain forms the primary boundary of the modelled warp extent (Figure 06), with the remainder following to the south of a road ran east-west from Brumby to Burringham in a similar position and alignment to the present Brumby Common Lane. The historic mapping (Figure 06) suggests a drain located alongside this road and emptied into Earl Beauchamp's drain which intersects the road and runs to the northwest. A further warping drain, Healey's Drain, is present in the mapping demarking the southern boundary of the Keepmoat site, though there is a less clear correlation with warping deposits and this drain than with Earl Beauchamp's Drain in the north and centre of the Lincolnshire Lakes site.

## 5.3 Radiocarbon Dating

5.3.1 No new radiocarbon dates have been acquired as part of the Keepmoat project, however further efforts have been made to integrate previous work undertaken at the site. This has recovered further radiocarbon dates beyond what are included within Table 04. Table 05 below comprehensively details all dates which have been produced from all work at the Lincolnshire Lakes site:

| Core / Trench | Sample | C14 Elevation (m OD) | C14 Sample Depth (m OD) | Radiocarbon Age (BP) | Calibrated Date (95.4%) | Historical Period |
|---|---|---|---|---|---|---|
| AOC Core 1A4 | Macroplant | -1.03 | 3.43 | 6951 ± 31 | 5902 - 5741 cal BC | Mesolithic |
| Brumby Common Trench 12 | Peat (Humin Acid) | 0.27 | 1.76-1.80 | 8170 ± 30 | 7317 -7065 cal BC | Mesolithic |
| Brumby Common Trench 12 | Peat (Humic Acid) | 0.27 | 1.76-1.80 | 6700 ± 30 | 5670 - 5556 cal BC | Mesolithic |
| AOC Core 1A3 | Peat (Humic Acid) | 0.3 | 2.1 | 6723 ± 28 | 5707 - 5568 cal BC | Mesolithic |
| AOC Trench 8 | Peat (Humic Acid) | 0.35 | 1.61 | 7726 ± 31 | 6631 - 6479 cal BC | Mesolithic |

| Core / Trench | Sample | C14 Elevation (m OD) | C14 Sample Depth (m OD) | Radiocarbon Age (BP) | Calibrated Date (95.4%) | Historical Period |
|---|---|---|---|---|---|---|
| AOC Core 1A2 | Peat (Humic Acid) | 0.5 | 1.9 | 5785 ± 25 | 4707 - 4555 cal BC | Mesolithic |
| AOC Trench 7 | Peat (Humic Acid) | 0.56 | 1.6 | 7515 ± 33 | 6451 - 6261 cal BC | Mesolithic |
| AOC Trench 4 | Peat (Humic Acid) | 0.71 | 1.69 | 1434 ± 33 | 568 - 657 cal AD | Early medieval |
| AOC Trench 9 | Peat (Humic Acid) | 0.72 | 1.15 | 6309 ± 31 | 5352 - 5218 cal BC | Mesolithic |
| AOC Core 1A2 | Macroplant | 0.76 | 1.64 | 268 ± 27 | 1521 - 1798 cal AD | Post-medieval |
| Brumby Common Trench 12 | Peat (Humin Acid) | 0.77 | 1.26-1.30 | 4040 ± 30 | 2663 - 2459 cal BC | Neolithic |
| Brumby Common Trench 12 | *Maloideae* roundwood | 0.97 | 1.06 | 3710 ± 30 | 2023 - 1983 cal BC | Neolithic |
| AOC Core 2A1 | Peat (Humic acid) | 1.15 | 0.89 | ? | 1521 - 1798 cal BC | Early Bronze Age |
| AOC Trench 11 | Peat (Humic Acid) | 1.21 | 0.66 | 3827 ± 31 | 2456 - 2148 cal BC | Neolithic |
| AOC Trench 1 | Peat (Humic Acid) | 1.41 | 0.67 | 4676 ± 33 | 3624 - 3367 cal BC | Neolithic |
| AOC Core 3A3 | Wood | 1.65 | 0.27 | ? | 2346 - 2143 cal BC | Neolithic/Early Bronze Age |
| AOC Core 2A3 | Macroplant | 1.73 | 0.31 | ? | 5880 - 5735 cal BC | Mesolithic |
| Scotter Road TP07 | Roundwood-*Pinus sylvestris* | 2.00 | 0.30-0.44 | 6930 ± 30 | 5887 - 5731 cal BC | Mesolithic |

Table 05. Radiocarbon dates acquired for the Lincolnshire Lakes site shown in order of elevation (m OD). Dates in red are likely intrusive and dates in grey have suspect elevations that do not correspond to the Lidar elevation for that intervention. Dates in yellow have only had calibrated dates recorded within the report. AOC cores/trenches are from AOC (2017a & b); Brumby Common trenches are from Trent and Peak (2021); Scotter Road is from YA (2023b).

5.3.2 The radiocarbon dates highlighted in red (Table 05) are likely the result of intrusive material due to the dates being notably younger than the rest. The date in grey may have an incorrect elevation as the reported elevation of the intervention (and sample) differs from the Lidar elevation at the intervention location. The yellow dates have only had their calibrated (95.4% probability) dates reported within the original reports (AOC 2017a & b) and their radiocarbon ages were absent. Also, the coordinates and elevations for these interventions were not reported and were acquired through georeferencing site plans and extrapolating the elevations from Lidar.

5.3.3 The radiocarbon dates from Table 05 further demonstrate the very wide spread of ages which have been acquired from the peat throughout the Lincolnshire Lakes site. Most of the radiocarbon dates are from the western portion of the site; other than the Scotter Road date in the north (Figure 07). The dates recovered from the peat span a range from around 7000 cal BC up to around 1500 cal BC. There is no correlation between elevation of the sample (m OD) and the calibrated date. There is no clear spatial pattern to the radiocarbon dates (Figure 07). Although there seems to be a dominance of Mesolithic dates which suggests the underlying sands are early-mid Mesolithic in age. There seems to then be renewed peat accumulation in the late Neolithic and into the Bronze Age, with later accumulations presumably truncated away by later agricultural activity.

## 6. DISCUSSION AND CONCLUSIONS

### 6.1 Overview of lithological sequence

6.1.1 The test pits which were monitored and recorded as part of the Keepmoat investigation recorded sub-surface stratigraphy identical to what was recorded elsewhere by previous investigations at the Lincolnshire Lakes site (AOC 2017a & b; Allen Archaeology 2015; YA, 2023a & b; Trent and Peak 2021).

6.1.2 The lowermost deposit recorded in all test pits was a fine sand which extended beyond the maximum excavated depth. These fine sands are interpreted as Sutton Sand Formation deposits, which corroborates BGS mapping across the Site. These sands, which are of aeolian origin, form extensive deposits throughout the Lincolnshire area known as coversand deposits and have been demonstrated to be up to 9m thick locally.

6.1.3 Overlying fine sands within 44 of the test pits was peat; predominantly present as a single layer, though within four test pits was present as two layers, with the lower being within the aeolian sand. The peat was recorded relatively close to the present-day surface at between 0.40-1.00m BGL; or around 0.24-1.60m OD. These peats were mostly well-humified and frequently containing a moderate sandy content. The lower peat, present within four test pits, was somewhat less well-humified and often contained woody inclusions including roundwood and larger fragments which possessed bark.

6.1.4 Overlying the fine sand and/or peat within seven of the monitored test pits was a relatively firm dark grey, occasionally silty, clay interpreted as being warping deposits resulting from deliberate flooding during the 19$^{th}$ century. There deposits were concentrated towards the southern half of the Keepmoat site and were recorded at around 0.30m BGL (1.40-2.00m OD).

### 6.2 Deposit survival and existing impacts

6.2.1 Throughout the Keepmoat site there was evidence of extensive agricultural activity which had impacted sub-surface deposits. The warp deposits that were recorded were close to the present-day ground surface and had experienced truncation through ploughing. It is possible that the subsoil which was recorded throughout the Keepmoat site derives from ploughed, truncated, warping deposits.

6.2.2 The peat deposits which were frequently recorded throughout the Keepmoat site were well-humified and relatively high in sandy content. These deposits are likely to have not been consistently saturated and were preserved instead through irregular seasonal groundwater saturation; with groundwater able to fluctuate rapidly owing to the very sandy sub-surface superficial geology. The peat deposits recorded as a second, lower deposit within four test pits (Tr20, Tr32, Tr33, and Tr34) were clearly less well-humified, with a clear observable macrofossil content reflecting more consistent water saturation.

## 6.3 Discussion of deposits

### Sutton Sands

6.3.1 The results of this assessment concur with the findings of earlier investigations at the same site (Allen Archaeology 2015; AOC 2017a; AOC 2017b; Trent and Peak 2021; YA 2023a & b), with sand-dominated sequences interleaved with peat and warp towards the top of the sequence. These sands represent Sutton Sand Formation coversands, which are present in significant thicknesses throughout the region spanning an area of around 400km$^2$ (McIlwaine and McDonnell, 2005). Scunthorpe Edge (*aka* the Lincoln Cliff or Lincolnshire Edge) which is at the western edge of the town and around 2km east of the site, forms a natural barrier to these aeolian deposits, which thin out significantly eastwards of this landform. To the west of the Scunthorpe Edge, where the site is located, these sands are demonstrated to be up to c.9.00m thick, whereas east of Scunthorpe Edge the sands have a mean thickness of 3.70m (James, 1976).

6.3.2 These wind-blown sands were initially deposited around 11,000 BP based on OSL dating at Willow Holt Quarry, Flixborough (McIlwaine and McDonnell, 2006) or around 12,500 BP (note that these are uncalibrated dates) based on OSL dating at nearby Cove Farm, Westwoodside (Bateman *et al*., 2005). OSL dating of the sands at Keadby immediately underlying peat deposits, located around 3.5km west of the Lincolnshire Lakes site, returned mid-Mesolithic dates of 7270-5490 cal BC (YA, 2022). Although these coversands were probably once formed as a continuous sheet (McIlwain and McDonnell, 2006) they have subsequently undergone repeated and extensive reworking until well into the later Holocene, both as a result of natural climatic fluctuations and anthropogenic impacts.

6.3.3 These reworked sands have also been demonstrated to overlie archaeological remains, including material of Mesolithic, Neolithic and Bronze Age date (McIlwain and McDonnell, 2006). However, neither this investigation nor any previous investigations at or close to the site has demonstrated any such remains to be present.

### Peat

6.3.4 Peat deposits were recorded in the Keepmoat test pits overlying aeolian sands within 44 test pits (Figure 04) and of these four test pits demonstrated two, discrete peat layers. Peat is present throughout the wider Lincolnshire Lakes site at variable elevations and with a considerably undulating subsurface topography. This peat is unlikely to represent a single continuous spread and likely developed as relatively small, localised deposits within depressions in the aeolian sands throughout the area. The deposits accumulated at the very edge of the wider Trent floodplain which would be sensitive to seasonal fluctuations in saturation.

6.3.5 Modelling of peat deposits from the wider Lincolnshire Lakes site (Figure 04; Section 5.2.4) illustrates a wide (if irregular) distribution throughout most of the site. These deposits were present at varied elevations from 2.50m OD to 0.20m OD with the lower end of this range being the elevation which most of the Keepmoat peat was recorded at. This varied elevation reflects partly a broad topographic descent from the north-east to the south-west where the Keepmoat site was located, though it also reflects a genuine variability that was present in peat elevation beyond topography.

6.3.6 One of these deposits (Brumby Common Trench 12; Table 05), has been assessed for palaeoenvironmental potential and demonstrated that pollen preservation and abundance within the peat was good, though diversity was somewhat limited (Trent and Peak, 2021). The pollen assessment suggested an initially very waterlogged, open aquatic setting surrounded by sedges, grasses, birch and willow. This transitions towards alder and hazel, though still within a waterlogged environment; likely an alder carr, which existed for much of the depositional history of the peat unit. Insect remains were poorly preserved and limited in extent, though those present suggested the area was characterised by slow-flowing and stagnant waters (Trent and Peak, 2021). Radiocarbon dating of both humic and humin fractions from the lower part of this sequence returned dates of 5670-5609 cal BC and 7194-7226 cal BC respectively; with the former date preferred as most reliable. Dating of the upper part of this sequence returned a radiocarbon date of 2632-2651 cal BC, suggesting that the deposit had formed over a prolonged period of around 3000 years.

6.3.7 Beyond the chronology described above, a total of eighteen radiocarbon dates have been acquired from the peat deposits throughout the Lincolnshire Lakes site; with two being deemed intrusive (Table 05). These were a very wide range of dates, with the oldest being around 7000 cal BC and the youngest around 1500 cal BC. There is no clear spatial pattern to the radiocarbon dates (Figure 07). Although there seems to be a dominance of Mesolithic dates which suggests the underlying sands are early-mid Mesolithic in age. There seems to then be renewed peat accumulation in the late Neolithic and into the Bronze Age, with later accumulations presumably truncated away by later agricultural activity. These episodes of peat accumulation may correlate with wider patterns of climatic change in the later prehistoric period, although higher resolution data would be required to confirm this.

6.3.8 To date there have been no archaeological finds or features dating to the prehistoric period recorded within the wider Lincolnshire Lakes site. Although given that these remains may be Mesolithic in date, this is perhaps not surprising. Other remains may relate to votive deposition of bronze artefacts, such as the hoard and weapons recovered from Burrington Common in the 19th century, which are also notoriously difficult to prospect for. The peat deposits themselves have not so far recorded evidence for waterlogged archaeological material but this still remains a possibility, especially in the areas of Bronze Age accumulation.

**Warp**

6.3.9 Modelling of warp deposits demonstrates that the presence of warp is associated with mapped drainage features (Figures 03 and 06). Both Lidar mapping and the 1885 OS map show warping drains which coincide with the limit of warp deposits (Figure 06), with the drain named as Earl Beauchamp’s Drain being a particularly prominent feature that demarcates warping limits. A band of warp was also modelled as following a road in the same location as the course of Brumby Common Lane (Figure 03).

6.3.10 Warp deposits were modelled to be present primarily within the west of the Lincolnshire Lakes site (Figure 03) and comparing the location of these deposits with the 1885 OS map illustrates that the limit of warp-containing interventions coincides with drainage features (Figure 06). These features are clearly observable on Lidar (Figure 02), and have been mapped and superimposed onto the 1885 OS map (Figure 06). Of the mapped drainage channels, the channel mapped as Earl Beauchamp's Drain forms the primary boundary of the modelled warp extent (Figure 06), with the remainder following to the south of a road ran east-west from Brumby to Burringham. The historic mapping (Figure 06) suggests a drain which was located alongside this road and emptied into Earl Beauchamp's drain which intersects the road and continues to the northwest. A further warping drain, Healey's Drain is present in the mapping demarcating the southern boundary of the Keepmoat site, though there is less clear spatial correlation with warping deposits and this drain than with Earl Beauchamp's Drain in the north and centre of the Lincolnshire Lakes site.

6.3.11 The history and progress of agricultural development, particularly of the practice of warping within this region, is excellently documented by Smith (2014) from whom the following historical information has been taken from. Although initially Parliamentary commissioners met with locals at a number of public venues between 1801 to 1809, agricultural improvements within the broader Trent-side parishes that made up what is now Scunthorpe town and region were slow. After the commissioners run out of patience and declared the process incomplete in 1809, it wasn't until almost 20 years later that the process truly began.

6.3.12 Warping had begun within the Burringham/Brumby area, within which the site is located, by around 1824 by Henry Healey. A local landowner who, upon inheriting his uncle's estate began a vigorous programme of enlargement and improvement of the Healey estate. It was during this time that Healey's drain, which demarcates the southern extent of the Keepmoat site (Figure 06), was created. At considerable expense, including several thousand pounds in compensation to nearby landowners whose land he unintentionally flooded, the process was completed by around 1842. Henry was by far the wealthiest landowner within the Burringham, Frodingham and Ashby parishes and so was mostly responsible for the creation of the warped landscape which exists within, at least, the Keepmoat portion of the Lincolnshire Lakes site.

6.3.13 To the north of the Keepmoat site, within the broader Brumby West Common area, which encompassed the remainder of the Lincolnshire Lakes site, the landscape remained unwarped even after 1842. This was largely due to a local landowner, Mrs Sally Smith, who resisted the process until her land passed to the Earl of Beauchamp at which point, in 1867, the land was improved. This extensive process involved the creation of Beauchamp's Drain which is located to the north of the Lincolnshire Lakes site, and has a large channel which was excavated south-east through the Lincolnshire Lakes site (Figure 06). Unlike the warp within, at least, the Keepmoat site, warp associated with Beauchamp's drain was deposited separately around 20-30 years later.

6.3.14 Although warp deposits such as these can cover archaeological remains and significant underlying deposits, no archaeological deposits were encountered within this assessment; neither have they been encountered within any previous investigation within the broader Lincolnshire Lakes site.

### 6.4 Potential impact on deposits

6.4.1 The proposed development for both the Keepmoat site, as well as the Lincolnshire Lakes site as a whole will be extensive. This will involve significant residential construction, infrastructure development, and the creation of artificial lakes. Impacts on the underlying superficial geology and any associated archaeological remains are likely to encompass at least the majority of the site boundary.

6.4.2 Developments that will directly impact the site are foundation construction, infrastructure development, and piling. The artificial lake is proposed to be at least 2.20m deep and will involve significant truncation of sub-surface superficial stratigraphy. All sub-surface deposits, including all organic-rich sediments within the artificial lake impact depth, will be removed by this development. However, secondary impacts will also likely be created through affecting the sub-surface hydrology of the site by piling and the remodelling of surface topography as part of flood mitigation strategies and SuDS (Sustainable Drainage System). The peat deposits, located close to the present-day surface and which are likely preserved through irregular water saturation, will be particularly sensitive to the impacts to sub-surface hydrology. In an area surrounding the artificial lake well point dewatering will be required, which will significantly impact the sub-surface hydrology for a large area.

6.4.3 Warp and reworked coversands have the potential to overlie and mask deposits of archaeological significance, which make prospection through traditional archaeological prospection techniques problematic. However, no such remains have been encountered either at the Keepmoat site, or the Lincolnshire Lakes site as a whole, despite at least seven previous investigations including this one (AOC 2017a & b; Allen Archaeology 2015; YA, 2023a & b; Trent and Peak 2021). However, the area still retains the potential to preserve such remains given the large scale of the development area in relation to the investigations carried out.

6.4.4 Organic deposits (peats) have been demonstrated to be present throughout the site (Sections 5.1.2 and 5.1.3) and at a range of depths, including relatively close to the current ground surface (within 1.00m BGL, Appendix 2). These deposits are present as intermittent, discrete deposits within the aeolian sands at a variety of elevations and are unlikely to represent a continuous single unit mappable across the site. Radiocarbon dating undertaken during previous studies has demonstrated that these organic remains span at least the Mesolithic into the later Bronze Age (Table 05). Previous palaeoenvironmental studies have demonstrated that these deposits can provide insights into past vegetation change, climate and potentially land use (Section 6.3.5); given the range of radiocarbon dates these deposits have the potential to provide palaeoenvironmental data over a prolonged period.

6.4.5 The warp and reworked aeolian sands have the potential to overlie deposits of archaeological significance, making them relatively invisible to traditional techniques of archaeological prospection (e.g. fieldwalking, aerial photography, test pitting). However, no such deposits have been encountered at the site despite numerous previous archaeological excavations (Allen Archaeology, 2015; AOC, 2017a; AOC, 2017b; Trent and Peak, 2021; YA, 2023a).

### 6.5 Consideration of research aims

6.5.1 This investigation has developed a greater understanding of the survival and extent of archaeological and palaeoenvironmental deposits which are present at the Keepmoat site. Additionally, this investigation has collated and built upon the numerous previous investigations which have been undertaken at the broader Lincolnshire Lakes site (AOC 2017a & b; Allen Archaeology 2015; YA, 2023a & b; Trent and Peak 2021).

6.5.2 This investigation presents the most comprehensive model and analysis yet undertaken for the wider Lincolnshire Lakes site; comprising over 260 separate interventions encompassing hand dug and machine-dug test pits, augering, evaluation trenches, and window-sampled and percussion cable boreholes. This deposit modelling then illustrates the extent of peat and warp deposits throughout the Lincolnshire Lakes site, enabling more accurate interpretations to be developed. Additionally, all previous radiocarbon dating undertaken at the Lincolnshire Lakes project has been collated within this report (Section 5.3; Table 05).

6.5.3 Through this more comprehensive and extensive modelling of warp deposits for the Lincolnshire Lakes site, this project has further addressed research aims within the East Midlands Regional Research Framework beyond those which were included in the original research questions in Section 3.1.4. These aims are within the 'Modern' portion of the research agenda (https://researchframeworks.org/emherf/research-agenda/9-modern/) and are as follows:

- 9.6.1 What was the impetus for the development of estate farming and rural agricultural industries, and what has been the landscape impact?
- 9.6.2 How did Parliamentary enclosure and other agricultural improvements (e.g. water management) impact upon the rural landscape?

### 6.6 Conclusions

6.6.1 This assessment has demonstrated a sediment sequence for the Keepmoat site which matched that which has been recorded by the numerous, previous Lincolnshire Lakes investigations (AOC 2017a & b; Allen Archaeology 2015; YA, 2023a & b; Trent and Peak 2021). This sequence was an aeolian sand-dominated Sutton Sand Formation (aka coversand) stratigraphy which spans almost the entirety of the sub-surface stratigraphy for the site. Overlying or within these sands were deposits of organic-rich sediment which were present at a variety of elevations and underlay either the modern topsoil/subsoil or warp. Four interventions recorded peat as two separate deposits within the sequence, separated by aeolian sands; a phenomenon noted by previous investigations elsewhere at the wider Lincolnshire Lakes site (YA 2023a).

6.6.2 Through compiling stratigraphic data from all previous archaeological investigations which have occurred throughout the wider Lincolnshire Lakes site (AOC 2017a & b; Allen Archaeology 2015; YA, 2023a & b; Trent and Peak 2021) this investigation presents the most comprehensive deposit modelling undertaken for the area. This results the most accurate and extensive illustration of both the distribution of peat and warp deposits. Peat has been shown to be present throughout the majority of the site at a variety of elevations, between 2.50 and 0.50m OD, reflecting both natural topographic trends as well as genuine variation in peat deposition elevation.

6.6.3 Additionally, modelling of warp deposits throughout the Lincolnshire Lakes site enabled a greater understanding of artificially deposited material throughout the area which could be related to 19$^{th}$ century agricultural development (Sections 6.3.10-6.3.12). Warping drains which were recorded both in historic mapping and observed on Lidar visualisations have been shown to define the limits of warping deposits at the Lincolnshire Lakes site, though those at the Keepmoat site were not so easily associated with mapped drains.

6.6.4 Although the deposits identified within the site have the potential to contain and overlie archaeological remains, no such remains were encountered. This supports the conclusions drawn by previous investigations at the Site (Allen Archaeology, 2015; AOC, 2017a; AOC, 2017b; Trent and Peak, 2021; YA, 2023a).

## 7. REFERENCES

Allen Archaeology. 2015. *Archaeological Watching Brief Report: Lincolnshire Lakes Project, Brumby Common Lane, Scunthorpe, North Lincolnshire*.

Allen Archaeology. 2015b. *Geophysical Survey by Magnetometry: Scunthorpe United Football Club Stadium Project, Scunthorpe, North Lincolnshire*.

Allen Archaeology. 2015c. *Geophysical Survey by Magnetometry: Lincolnshire Lakes Project, Scunthorpe, North Lincolnshire*.

Allen Archaeology. 2015d. *Palaeoenvironmental Survey: Proposed Scunthorpe United Football Ground, Land off Brumby Common Lane, Scunthorpe, North Lincolnshire*.

AOC Archaeology Group. 2017a. *Lake L1, Lincolnshire Lakes Scunthorpe, North Lincolnshire Archaeological Evaluation Report*. Unpublished AOC report ****

AOC Archaeology Group. 2017b. *Lake L1, Lincolnshire Lakes Scunthorpe, North Lincolnshire Post-Excavation Assessment Report*. Unpublished AOC report ****.

Baker, C., Bateman, M., Bateman, P. and Jones, H. 2013. The aeolian sand record in the Trent valley. *Mercian Geologist* **18**(**2**), 108-118.

Bateman, M.D., Murton, J.B. and Crowe, W. 2000. Late Devensian and Holocene depositional environments associated with the coversands round Caistor, North Lincolnshire, UK. *Boreas* **16**, 1-16.

Bateman, M.D., Evans, D.,J.,A., Buckland, P.C., Connell, E.R., Friend, R.J., Hartmann, D., Moxon, H., Fairburn, W.A., Panagiotakopulu, E. and Ashurst, R.A. 2015. Last glacial dynamics of the Vale of York and North Sea lobes of the British and Irish Ice Sheet. *Proceedings of the Geologists' Association* **126**(**6**), 712-730.

Blinkhorn, E and Milner, N. 2013. Mesolithic research and conservation framework 2013. Mesolithic Wiki: Meso_Res_Cons_Framework (archaeologydataservice.ac.uk)

British Geological Survey https://mapapps.bgs.ac.uk/geologyofbritain3d/

Brown, D.H. 2007. Archaeological Archives – A guide to best practice in creation, compilation, transfer and curation. (IFA/AAF).

Cappers, R., Bekker, R. and Jans, J. 2012. *Digitale zadenatlas van Netherlands/Digital seed atlas of the Netherlands*. Groningen Archaeological Studies 4. 2nd Edition. Online Version available at: https://www.plantatlas.eu/repository.

Chartered Institute for Archaeologists (CIfA). 2019. *Code of Conduct*. Reading

Chartered Institute for Archaeologists. 2020b. *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives*. Reading.

Chartered Institute for Archaeologists. 2020c. *Standards and Guidance for archaeological field evaluation.*

Chartered Institute for Archaeologists. 2020d. *Standards and Guidance for archaeological watching brief.*

Foster, T. and Longley, C.W 1924. The Lincolnshire Domesday and the Lindsey Survey. *Publications of the Lincoln Record Society 19.*

Historic England. 2006. *Management of Recording Projects in the Historic Environment (MoRPHE)*. Swindon: Historic England.

Historic England. 2011. *Environmental Archaeology. A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition)*. Swindon: Historic England.

Historic England. 2015a. *Geoarchaeology: Using earth sciences to understand the archaeological record. Swindon: Historic England*.

Historic England. 2015b. Digital Image Capture and File Storage: A guide to best practice. Swindon. Historic England.

Historic England. 2016. *Preserving archaeological remains: Decision-taking for Sites under development*. Swindon: Historic England.

Historic England. 2020. *Deposit Modelling and Archaeology: Guidance for mapping buried deposits*. Swindon: Historic England.

Historic England. 2022. Radiocarbon Dating and Chronological Modelling: guidelines and best practice. Swindon. Historic England.

James, J. 1976. *The sand and gravel resources of the country north-west of Scunthorpe, Humberside*. *Mineral Assessment report of the Institute of Geological Sciences* **22**.

Lillie, M. 1997. *Alluvium and warping in the Humberhead Levels: the identification of factors obscuring palaeolandsurfaces and the archaeological record. In: Van de Noort, R. and Ellis, S. (eds) Wetland Heritage of the Humberhead Levels. An Archaeological Survey*. University of Hull: Humber Wetlands Project. 191-218.

Lille, M. 1998. Alluvium and warping in the lower Trent valley. In R, Van De Noort . and S, Ellis (eds) *Wetlands Heritage of the Ancholme and Lower Trent Valleys*. Short Run Press: Exeter.

Lincolnshire County Council. 2019. Archaeology Handbook. Lincoln: Lincolnshire County Council.

MAP 2022. Lincolnshire Lakes East, Burringham, Scunthorpe, North Lincolnshire written scheme of investigation for archaeological test trenching.

McIlwaine, J. and McDonnell, G. 2006: *North Lincolnshire Coversands Research Project*. Final Project Report for English Heritage, ASLF/PD **3548.**

Peacock, E. 1889. A Glossary of Words Used in the Wapentakes of Manley and Corringham, Lincolnshire. Vol. I. 2nd edn. Trubner and Co.: London.

Schoch, W., Heller, I., Schweingruber, F.H. and Kienast, F. 2004. *Wood Anatomy of Central European Species.* Online version: www.woodanatomy.ch.

Schweingruber, F. 1982. *Microscopic Wood Anatomy*. Zurich

Smith, T. 2014. Warping and parliamentary enclosure: the example of north-west Lindsey, Lincolnshire. *Agricultural History Review* 62(1), 83-97

Trent & Peak. 2021. *A palaeoenvironmental assessment of samples from Brumby Common, Scunthorpe, Lincolnshire*. Report No. **120/2021.**

Troels-Smith, J. 1955. Karakteriseringaf lose jordater (characterisation of unconsolidated sediments). *DenmarksGeologiskeUndersogelse*, Series IV/3, 10, 73.

Watkinson. D. and Neal. V. 1998. *First Aid for Finds.* London: Rescue/UKIC.

York Archaeology. 2022. *Keadby 3 Carbon Capture Power Station Project, Keadby, North Lincolnshire*. Report No. **2022/171**.

York Archaeology. 2023a. Lincolnshire Lakes, Scunthorpe: Geoarchaeological Assessment. YA Report No. 2023/183

York Archaeology. 2023b. *Land at Scotter Road, Scunthorpe, Lincolnshire. Report on an archaeological test trench evaluation*. York Archaeology Report No. **2023/067**.

## 8. APPENDIX 1 – TROELS-SMITH

| Darkness | |
|---|---|
| nig.4 | black |
| nig.3 | |
| nig.2 | |
| nig.1 | |
| nig.0 | white |

| Degree of Stratification | |
|---|---|
| strf.4 | well stratified |
| strf.3 | |
| strf.2 | |
| strf.1 | |
| strf.0 | no stratification |

| Degree of Elasticity | |
|---|---|
| elas.4 | very elastic |
| elas.3 | |
| elas.2 | |
| elas.1 | |
| elas.0 | no elasticity |

| Degree of Dryness | |
|---|---|
| sicc.4 | very dry |
| sicc.3 | |
| sicc.2 | |
| sicc.1 | |
| sicc.0 | water |

| | Sharpness of Upper Boundary |
|---|---|
| lim.4 | < 0.5mm |
| lim.3 | < 1.0 &> 0.5mm |
| lim.2 | < 2.0 &> 1.0mm |
| lim.1 | < 10.0 &> 2.0mm |
| lim.0 | > 10.0mm |

| | | | |
|---|---|---|---|
| | Sh | Substantia humosa | Humous substance, homogeneous microscopic structure |
| I Turfa | Tb | T. bryophytica | Mosses +/- humous substance |
| | Tl | T. lignosa | Stumps, roots, intertwined rootlets, of ligneous plants |
| | Th | T. herbacea | Roots, intertwined rootlets, rhizomes of herbaceous plants |
| II Detritus | Dl | D. lignosus | Fragments of ligneous plants >2mm |
| | Dh | D. herbosus | Fragments of herbaceous plants >2mm |
| | Dg | D. granosus | Fragments of ligneous and herbaceous plants <2mm >0.1mm |
| III Limus | Lf | L. ferrugineus | Rust, non-hardened. Particles <0.1mm |
| IV Argilla | As | A.steatodes | Particles of clay |
| | Ag | A. granosa | Particles of silt |
| V Grana | Ga | G. arenosa | Mineral particles 0.6 to 0.2mm |
| | Gs | G. saburralia | Mineral particles 2.0 to 0.6mm |
| | Gg(min) | G. glareosa minora | Mineral particles 6.0 to 2.0mm |
| | Gg(maj) | G. glareosa majora | Mineral particles 20.0 to 6.0mm |
| | Ptm | Particulaetestaemolloscorum | Fragments of calcareous shells |

**Physical and sedimentary properties of deposits according to Troels-Smith (1955)**

## 9. APPENDIX 2 – BOREHOLE AND TEST PIT LOGS

| Borehole Number | Depth (m) upper | Depth (m) lower | Da | St | El | Sicc | UB | Troels-Smith Texture | Description |
|---|---|---|---|---|---|---|---|---|---|
| Tr14 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr14 | 0.32 | 0.94 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow fine sand |
| Tr14 | 0.94 | 1.56 | 4 | 1 | 2 | | | Dl4 | Black very woody peat. Abundant branches and wooden fragments. Birch bark and branches very common |
| Tr14 | 1.56 | 3 | 2 | 4 | | | | Ga4, Ag+ | Pale grey fine sand |
| | | | | | | | | | |
| Tr16 | 0 | 0.42 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr16 | 0.42 | 0.56 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow fine sand |
| Tr16 | 0.56 | 0.76 | 4 | 1 | 2 | | | Dl4 | Black very woody peat. Abundant branches and wooden fragments |
| Tr16 | 0.76 | 2.85 | 2 | 4 | | | | Ga4, Ag+ | Pale grey fine sand |
| | | | | | | | | | |
| Tr18 | 0 | 0.34 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr18 | 0.34 | 0.72 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow fine sand |
| Tr18 | 0.72 | 0.84 | 4 | 1 | 2 | | | Dh4 | Black well humified peat |
| Tr18 | 0.84 | 3 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr19 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr19 | 0.32 | 0.72 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow fine sand |
| Tr19 | 0.72 | 0.96 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat. Lower boundary well mixed with underlying sand deposit |
| Tr19 | 0.96 | 3 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tr20 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr20 | 0.32 | 0.92 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow fine sand |
| Tr20 | 0.92 | 1.1 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat. Lower boundary well mixed with underlying sand deposit |
| Tr20 | 1.1 | 2.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| Tr20 | 2.5 | 2.7 | 4 | 1 | 2 | | | Dh2, Dl2 | Black humified peat with abundant woody inclusions of twigs and small branches |
| Tr20 | 2.7 | 3 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr21 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr21 | 0.32 | 0.72 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow fine sand |
| Tr21 | 0.72 | 0.76 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat. Lower boundary well mixed with underlying sand deposit |
| Tr21 | 0.76 | 2 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr22 | 0 | 0.34 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr22 | 0.34 | 2 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr23 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr23 | 0.32 | 3 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr24 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tr24 | 0.32 | 3 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr25 | 0 | 0.42 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr25 | 0.42 | 0.52 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat |
| Tr25 | 0.52 | 3 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr26 | 0 | 0.38 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr26 | 0.38 | 1.6 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr27 | 0 | 0.4 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr27 | 0.4 | 0.48 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat. Lower boundary well mixed with underlying sand deposit. Tree/hedge roots preseny |
| Tr27 | 0.48 | 2 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr28 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr28 | 0.32 | 0.38 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow fine sand |
| Tr28 | 0.38 | 0.46 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat |
| Tr28 | 0.46 | 1.4 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr29 | 0 | 0.34 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr29 | 0.4 | 0.46 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat |
| Tr29 | 0.46 | 2.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| Tr30 | 0 | 0.24 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr30 | 0.24 | 0.4 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow fine sand |
| Tr30 | 0.54 | 0.68 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat. |
| Tr30 | 0.46 | 2 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr31 | 0 | 0.18 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr31 | 0.18 | 0.92 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow fine sand |
| Tr31 | 0.92 | 1.1 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat. |
| Tr31 | 1.1 | 2.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr32 | 0 | 0.42 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr32 | 0.42 | 0.56 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow fine sand |
| Tr32 | 0.56 | 0.62 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat. |
| Tr32 | 0.62 | 2.7 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| Tr32 | 2.7 | 2.85 | 5 | 2 | | | 4 | Ga2, Sh2 | Very sandy very well humified peat |
| Tr32 | 2.85 | 3 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr33 | 0 | 0.34 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr33 | 0.34 | 0.56 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow fine sand |
| Tr33 | 0.56 | 0.78 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat. |
| Tr33 | 1.1 | 2.7 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| Tr33 | 2.7 | 2.85 | 5 | 2 | | | 4 | Dl2, Sh1, Ga1 | Very dark brown-black moderately humified woody peat |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tr33 | 2.85 | 3 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr34 | 0 | 0.48 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr34 | 0.48 | 0.62 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow fine sand |
| Tr34 | 0.62 | 0.74 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat. Heavily mixed with sand |
| Tr34 | 0.74 | 2.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| Tr34 | 2.5 | 2.75 | 5 | 2 | | | 4 | Dl2, Sh1, Ga1 | Very dark brown-black moderately humified woody peat |
| Tr34 | 2.75 | 2.9 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr36 | 0 | 0.18 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr36 | 0.18 | 0.4 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow fine sand |
| Tr36 | 0.4 | 0.52 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat. Heavily mixed with sand |
| Tr36 | 0.52 | 2.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr37 | 0 | 0.22 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr37 | 0.22 | 0.4 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow fine sand |
| Tr37 | 0.4 | 0.46 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified sandy peat |
| Tr37 | 0.46 | 2.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr38 | 0 | 0.3 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr38 | 0.3 | 0.42 | 4 | 1 | 2 | | | Dh2, Ga2 | Black well humified peat. Heavily mixed with fine sand |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tr38 | 0.3 | 3 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr39 | 0 | 0.3 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr39 | 0.3 | 1.4 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr40 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr40 | 0.3 | 1.4 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr41 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr41 | 0.28 | 0.78 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow fine sand |
| Tr41 | 0.78 | 0.86 | 4 | 1 | 2 | | 5 | Dh2, Ga2 | Black well humified sandy peat |
| Tr41 | 0.86 | 2.8 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr42 | 0 | 0.28 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr42 | 0.28 | 0.4 | 4 | 4 | | | 4 | As3, Ag1 | Dark grey silty clay. Warp |
| Tr42 | 0.4 | 0.46 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow fine sand |
| Tr42 | 0.46 | 0.62 | 4 | 1 | 2 | | 5 | Dh2, Ga2 | Black well humified sandy peat |
| Tr42 | 0.62 | 2.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr43 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr43 | 0.32 | 0.44 | 4 | 4 | | | 4 | As3, Ag1 | Dark grey silty clay. Warp |
| Tr43 | 0.44 | 0.5 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow fine sand |
| Tr43 | 0.5 | 0.62 | 4 | 1 | 2 | | 5 | Dh2, Ga2 | Black well humified sandy peat |
| Tr43 | 0.62 | 2.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| Tr44 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr44 | 0.32 | 0.74 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow fine sand |
| Tr44 | 0.74 | 0.82 | 4 | 1 | 2 | | 5 | Dh2, Ga2 | Black well humified sandy peat |
| Tr44 | 0.82 | 2.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr45 | 0 | 0.36 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr45 | 0.32 | 0.74 | 2 | 4 | | | | Ga4, Ag+ | Pale yellow fine sand |
| Tr45 | 0.74 | 0.8 | 4 | 1 | 2 | | 5 | Dh2, Ga2 | Black well humified sandy peat |
| Tr45 | 0.8 | 2.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr46 | 0 | 0.32 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr46 | 0.32 | 0.76 | 4 | 4 | | | 5 | As4, Ag+ | Dark grey clay. Warp |
| Tr46 | 0.76 | 0.84 | 5 | 3 | | | 5 | Sh2, Ga2 | Black very well humified sandy peat |
| Tr46 | 0.84 | 2.1 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand. |
| Tr46 | 2.1 | 2.4 | 5 | 3 | | | 4 | Th3, Sh1 | Black herbaceous peat. Rootlets and reed fragments common |
| Tr46 | 2.4 | 2.6 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand. |
| | | | | | | | | | |
| Tr47 | 0 | 0.38 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr47 | 0.78 | 2 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand. Upper boundary contains very well humified peat mixed into deposit |
| | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tr48 | 0 | 0.26 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr48 | 0.28 | 0.78 | 4 | 4 | | | 5 | As4, Ag+ | Firm dark grey clay. Warp. |
| Tr48 | 0.78 | 2 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr52 | 0 | 0.28 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr52 | 0.28 | 0.68 | 3 | 4 | | | 4 | Ga2, Ag2 | Dark brownish orange sandy silt. Warp |
| Tr52 | 0.68 | 0.86 | 5 | 3 | | | 4 | Sh2, Ga2 | Black well humified sandy peat |
| Tr52 | 0.86 | 2.7 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr53 | 0 | 0.38 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr53 | 0.38 | 0.6 | 5 | 3 | | | 4 | Sh2, Ga2 | Black well humified sandy peat |
| Tr53 | 0.6 | 2.7 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr54 | 0 | 0.4 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr54 | 0.4 | 0.68 | 5 | 3 | | | 4 | Sh2, Ga2 | Black well humified sandy peat |
| Tr54 | 0.68 | 2.7 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr55 | 0 | 0.28 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr55 | 0.28 | 0.78 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow fine sand |
| Tr55 | 0.78 | 1.02 | 4 | 4 | | | 4 | As3, Ga1 | Firm grey sandy clay. Warp |
| Tr55 | 1.02 | 2.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tr56 | 0 | 0.28 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr56 | 0.28 | 1.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr57 | 0 | 0.34 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr57 | 0.34 | 0.68 | 4 | 4 | | | 3 | As3, Sh1 | Dark grey clay mixed with humified peat. Warp |
| Tr57 | 0.68 | 1.5 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr58 | 0 | 0.4 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr58 | 0.4 | 0.48 | 3 | 4 | | | 4 | Ga3, Sh1 | Pale yellow fine sand with very well humified peat mixed into the deposit |
| Tr58 | 0.48 | 1.7 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr59 | 0 | 0.4 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr59 | 0.4 | 0.68 | 3 | 4 | | | 4 | Ga3, Sh1 | Pale yellow fine sand with very well humified peat mixed into the deposit |
| Tr59 | 0.68 | 1.58 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr60 | 0 | 0.36 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |
| Tr60 | 0.36 | 1.7 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |
| | | | | | | | | | |
| Tr61 | 0 | 0.36 | 3 | 3 | | | | Ga2, Ag2, As+ | Dark brown sandy loam agricultural topsoil with pale brown sandy loam subsoil |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tr61 | 0.36 | 0.48 | 3 | 4 | | | 4 | Ga3, Sh1 | Pale yellow fine sand with very well humified peat mixed into the deposit |
| Tr61 | 0.48 | 2.8 | 2 | 4 | | | 2 | Ga4, Ag+ | Pale yellow, becoming pale grey fine sand |

**APPENDIX 3 – Selected photographs**

Plate 1. Post-excavation shot of TR18

Plate 2. Post-excavation shot of TR19

Plate 3. Post-excavation shot of Tr24

Plate 4. Post-excavation shot of Tr28


Plate 5. Post-excavation shot of Tr38


Plate 6. Post-excavation shot of Tr40


Plate 7. North-west facing site photo


Plate 8. West-facing site photo

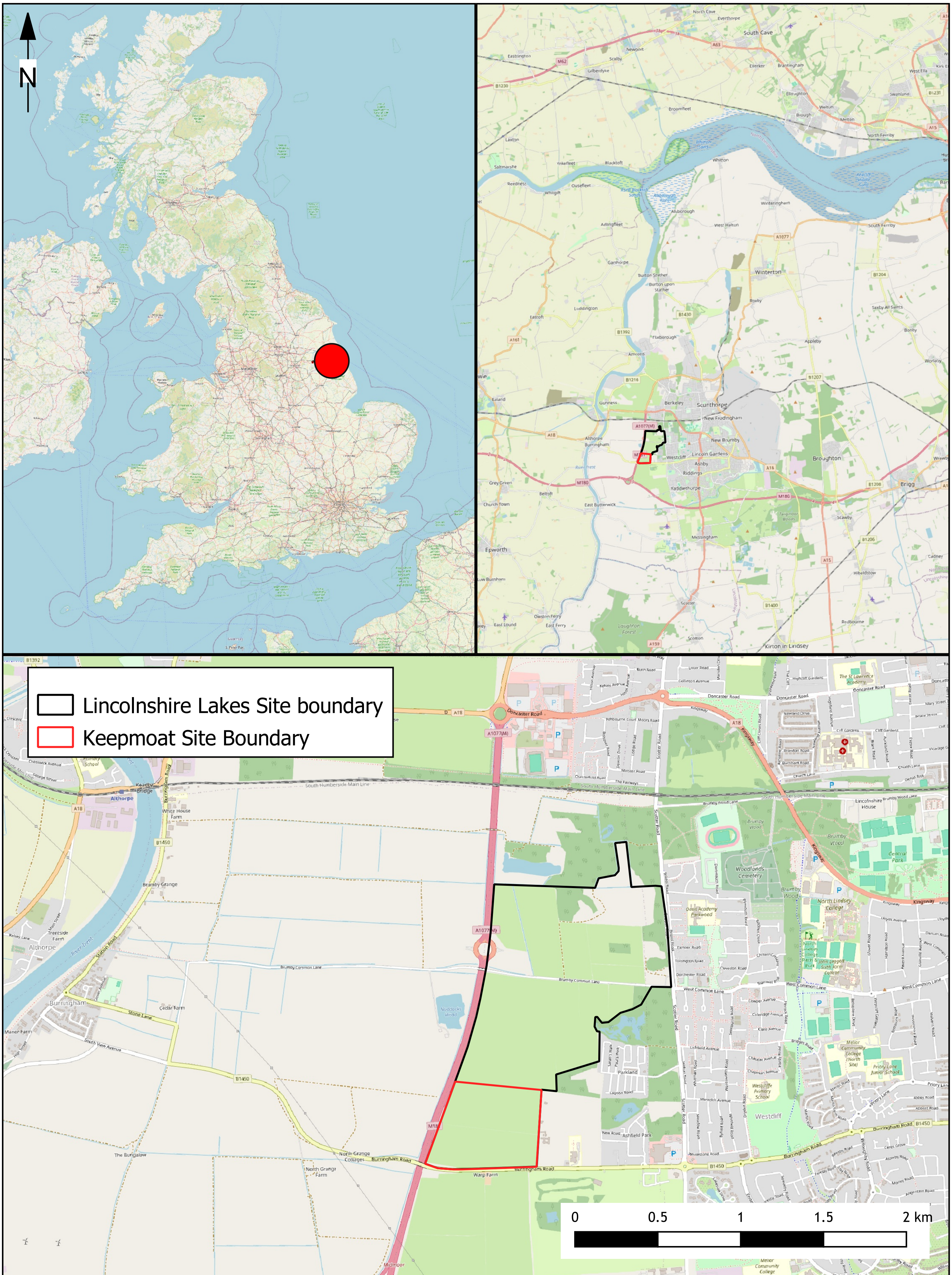


Figure 01 - Site location

Keepmoat, Scunthorpe geoarchaeological assessment

Scale at A4 - Varies

Drawn by: LP

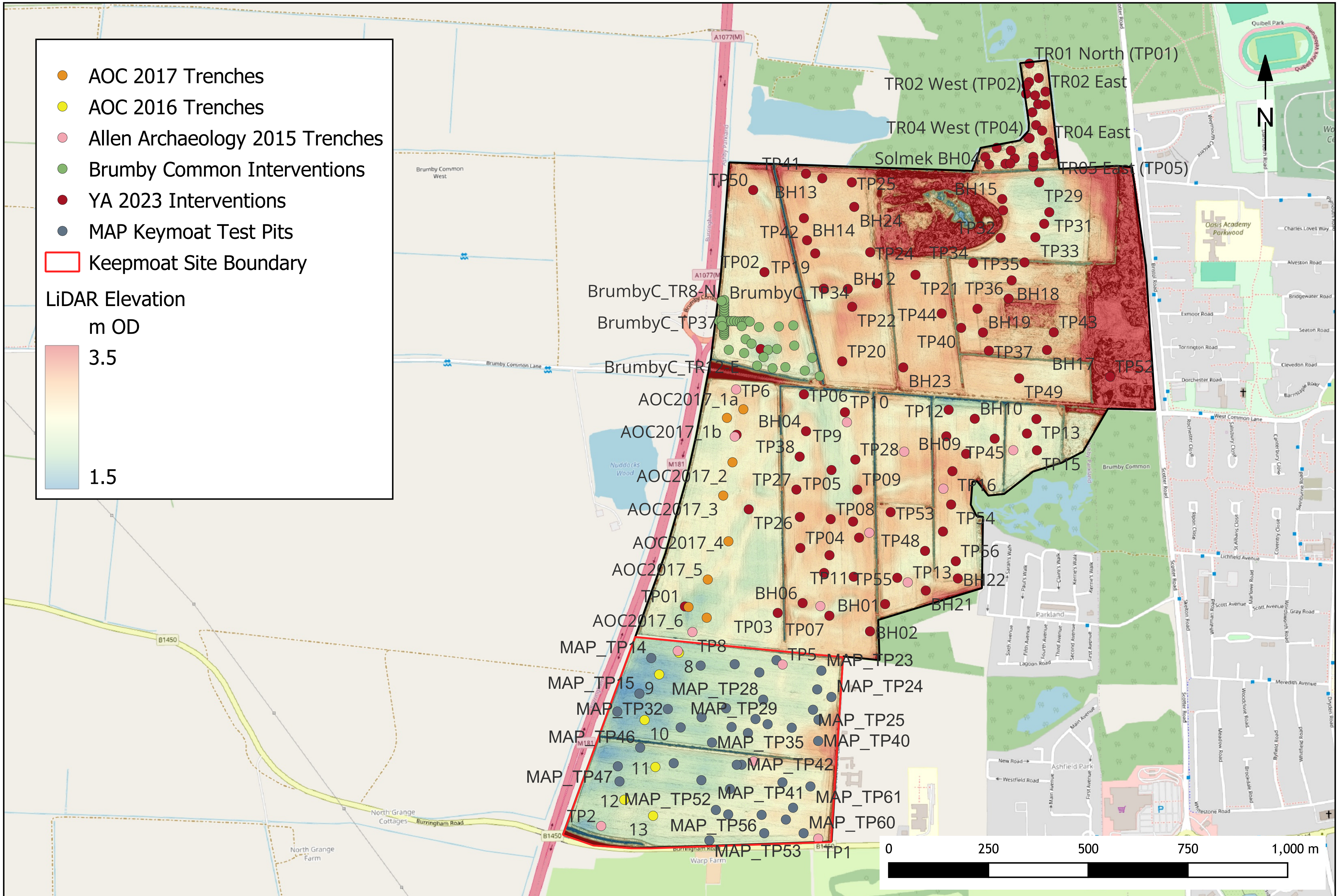


Figure 02 - Intervention Locations

Keymoat, Scunthorpe georchaeological assessment

Scale at A4 - 1:12000

Drawn by: LP

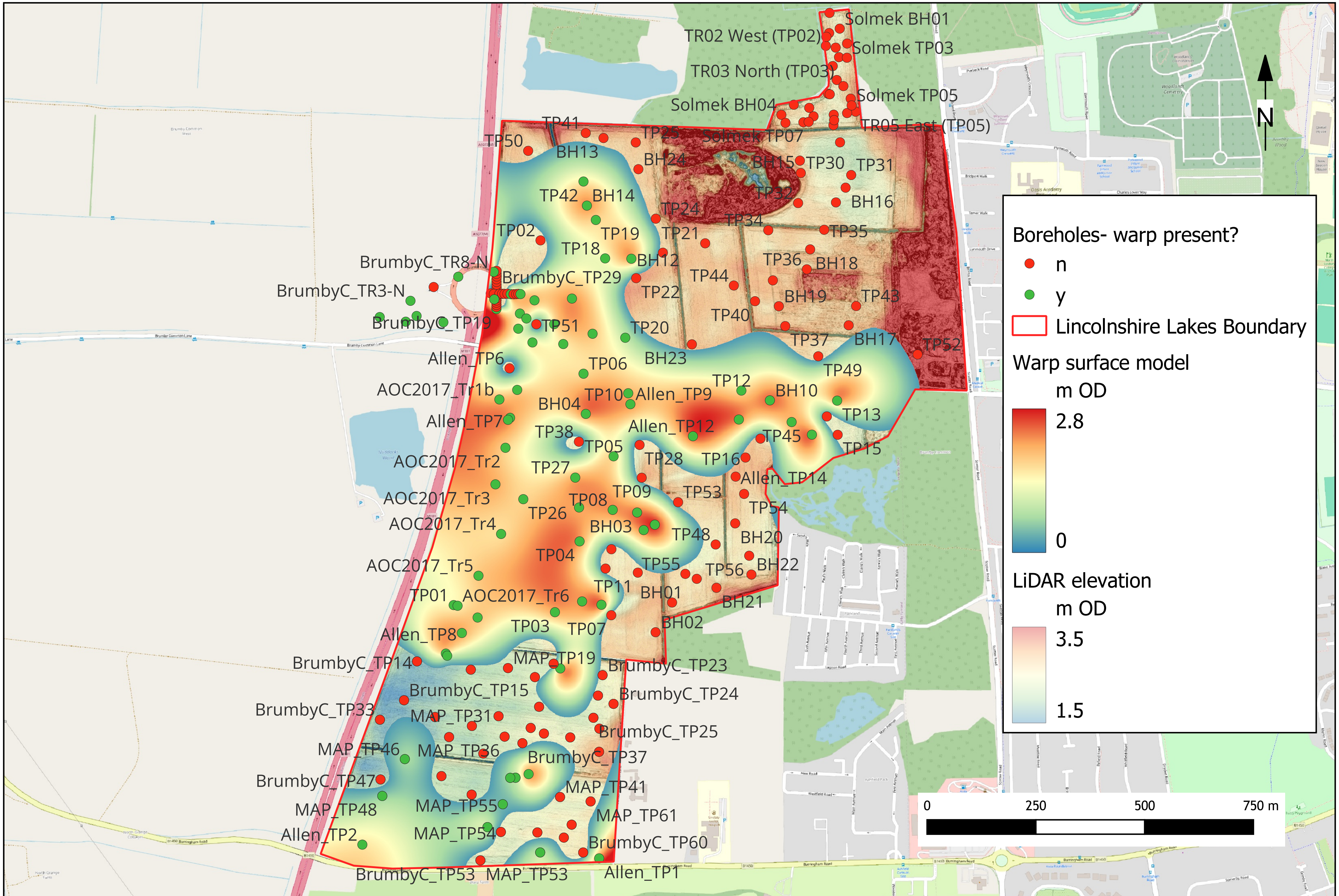


Figure 03 - Warp surface model
Keepmoat, Scunthorpe

Scale at A4 - 1:11000
Drawn by: LP

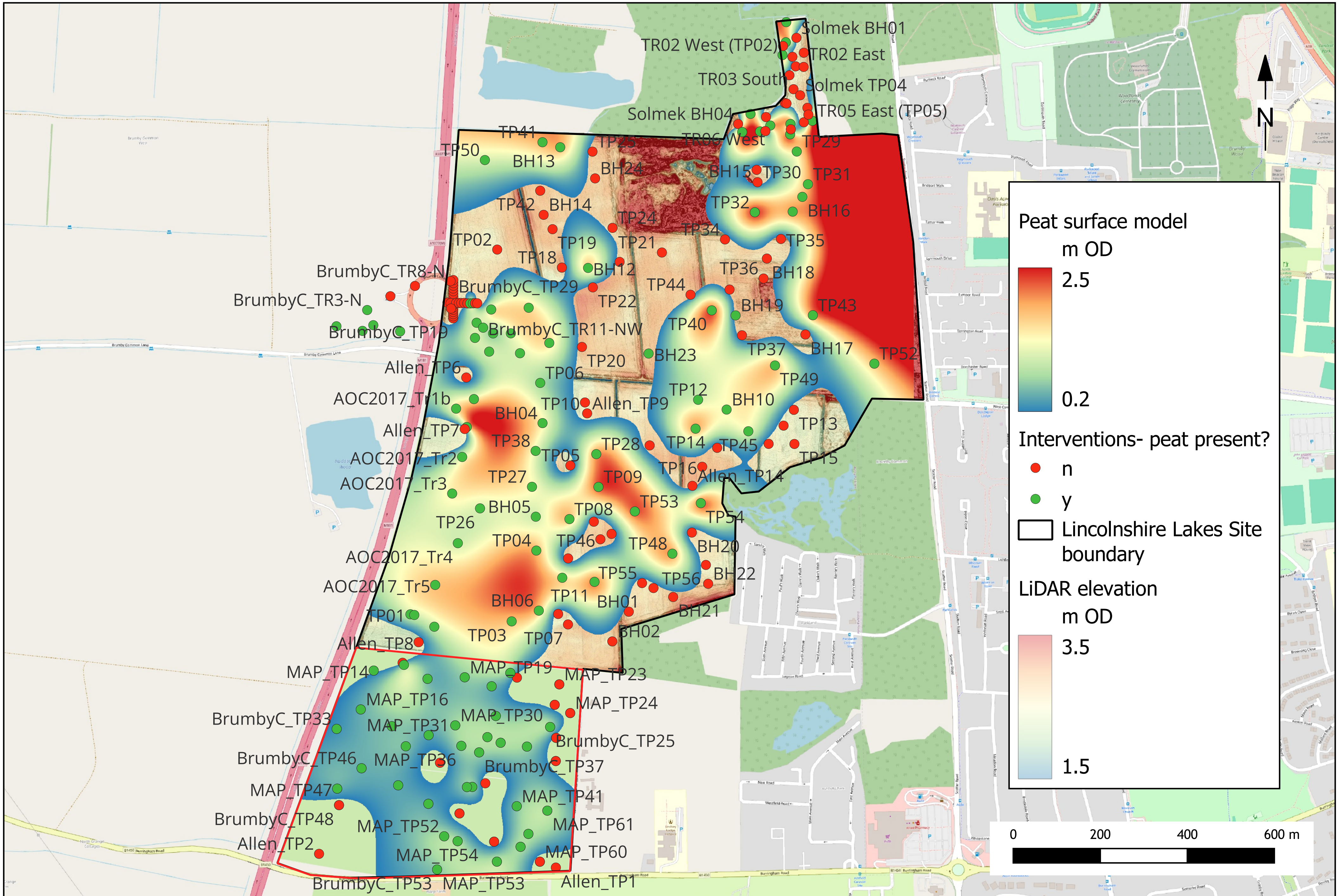


Figure 04 - Peat surface model

Keepmoat, Scunthorpe

Scale at A3 - 1:11000

Drawn by: LP

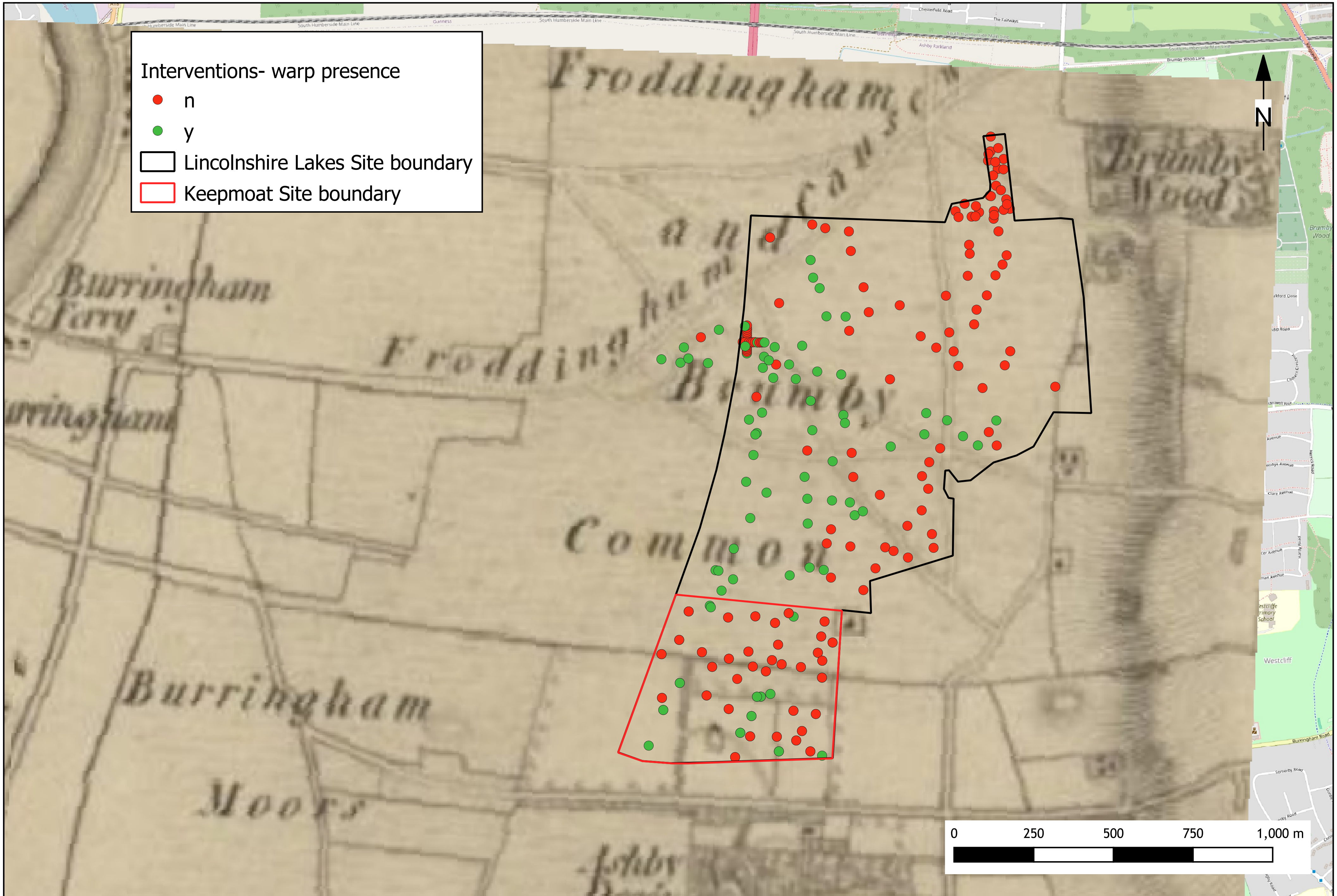


Figure 05 - 1805-1845 Historic Mapping

Keymoat, Scunthorpe geoarchaeological assessment

Scale at A4 - 1:15000

Drawn by: LP

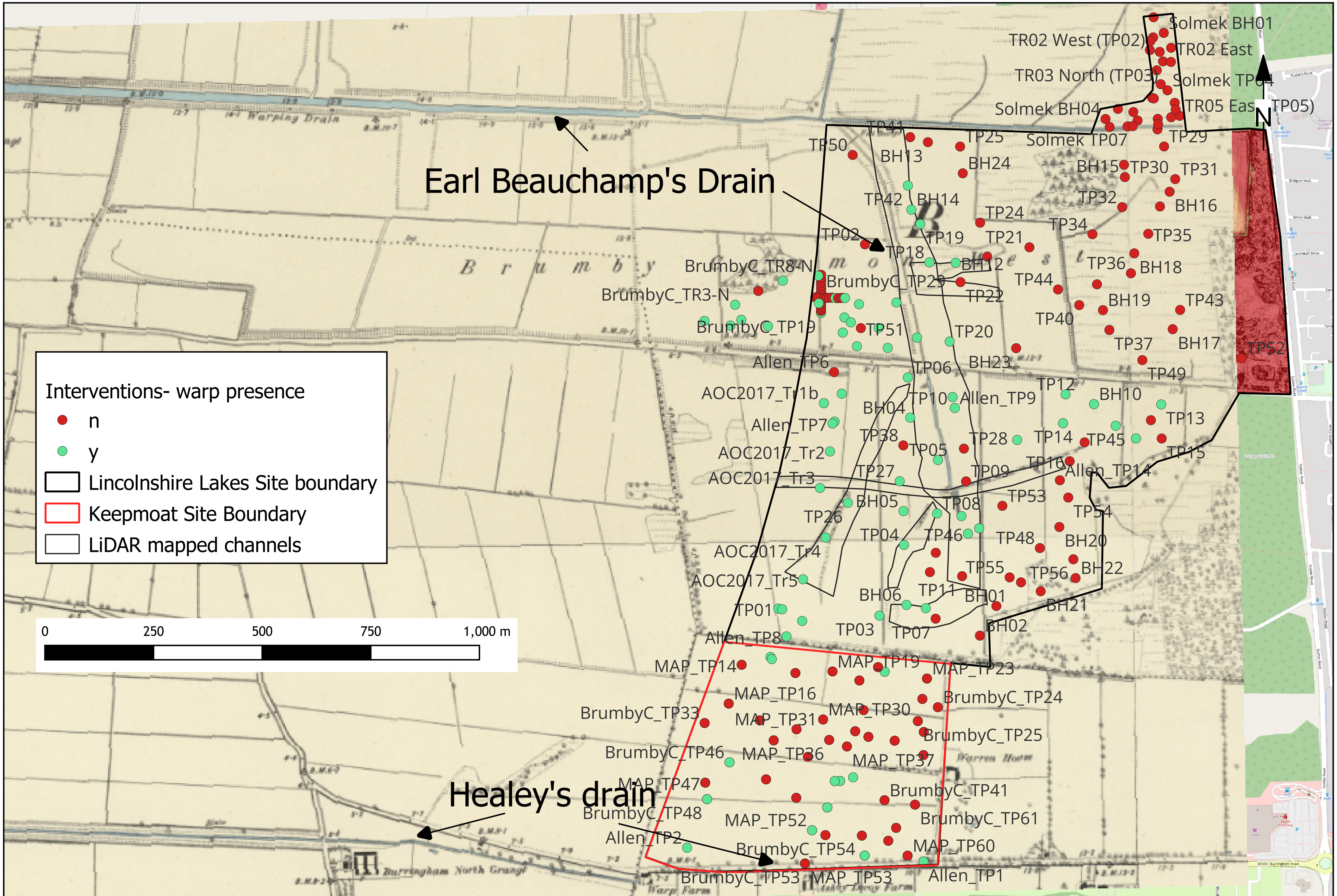


Figure 06 - 1885 OS historic mapping

Keepmoat, Scunthorpe geoarchaeological assessment

Scale at A4 - 1:11000

Drawn by: LP

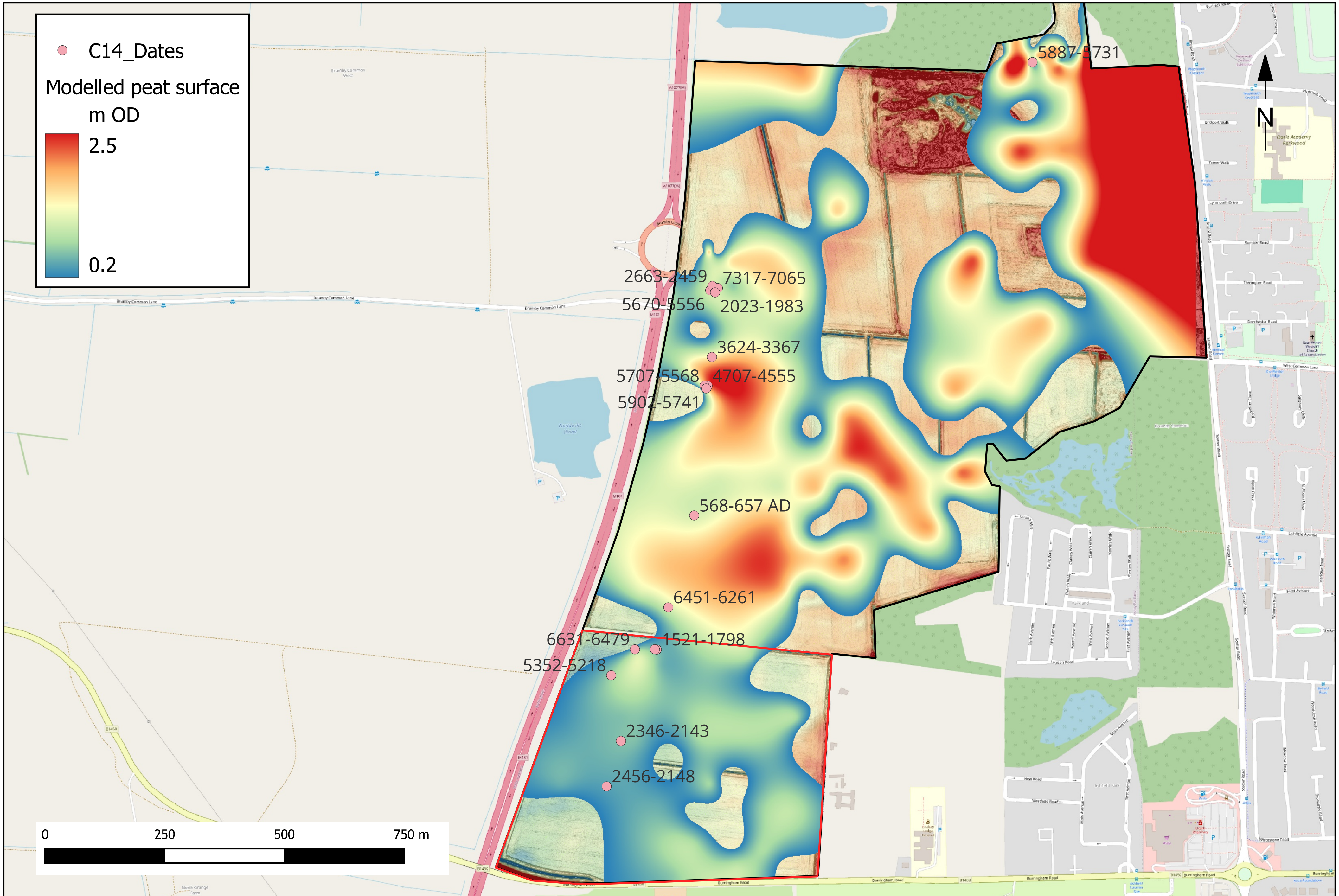


Figure 07 - Radiocarbon dates w/peat surface model

Keepmoat, Scunthorpe

Scale at A4 - 1:10000

Drawn by: LP